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Possible effects of antioxidants on control of noise induced hearing loss: a systematic review and meta-analysis

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Abstract

Background & Objective: After noise exposure, large quantities of Reactive Oxygen Species (ROS) are released in human body. These free radicals that disrupt the balance of antioxidant defence system play a significant role in the loss of hearing cells and incidence of noise induced hearing loss (NIHL).Recent researches have focused on compensating for the imbalance between free radicals and antioxidants through taking dietary antioxidant supplements. This review article tries to summarize systematically the findings of these studies.

Method: At early stage of this systematic review, once formulating the research questions, the research protocols were developed. The Scopus, PubMed, Elsevier, and ProQuest databases were searched based on the key words and their MeSH terms. English language publications over the period between 1993 and 2013 were included in the study. According to the eligibility criteria, the relevant papers were searched, archived, and screened in three subsequent steps in terms of title, abstract, and full text content. At each step, a number of papers, which were failed to meet the inclusion criteria, were excluded. Finally, the content of the shortlisted papers were reviewed systematically. The data of the papers was also meta-analyzed by inverse variance weighted method to find possible relationship between type and time of supplementation by antioxidants and incidence of NIHL among exposed subjects.

Result: In the first round of searching, a total number of 1003 articles were found. The papers were screened through frequent appraisals by two experts until to be shortlisted to a total number of 6 papers, after excluding duplicates and those beyond the research scope. There was found a significant correlation between the supplementation with antioxidant vitamins (A, C, and E, and Magnesium) and reduced loss of auditory hair cells and control of NIHL among the exposed subjects ($p<0.001$). The results of meta-analysis revealed that the use of antioxidants such as vitamins A, C, and E, and Magnesium are effective to prevent loss of auditory hair cells and the incidence of NIHL.

Conclusion: When there is no hearing protection equipment, hearing loss can be reduced by the use of antioxidants, which reduces oxidative stress in the inner ear. The supplementation by Magnesium and vitamins, especially together with the use of ear protection equipment, can reduce the frequency and severity of hearing loss. Treatment by antioxidants prior to noise exposure will be more effective and increase the success rate of the NIHL control.

Keywords: Noise exposure, free radicals, antioxidants, hearing loss

Introduction

Noise, known as an unwanted, environmental annoying stressor, [1] is one of the most common problems of populated cities and workplaces in today's world. Industrialized societies have increased the number of people exposed to the unwanted noise. According to estimates, more than 600 million people worldwide are exposed to hazardous noise in their workplace; from which, 50 to 60 million people are living in European countries and North America [2]. National Institute for Occupational Safety and Health (NIOSH) estimates that 14% of workers are exposed to hazardous sound levels higher than the permissible exposure limit of 90 dB (A) [2]. One of the effects of exposure to excessive sound levels is hearing loss, for which various mechanisms have been proposed in relevant literature.

It was originally thought that mechanical destruction of cells in the organ of Corti or possible blood flow reduction to the inner ear are major causes for noise-induced hearing loss (NIHL) [3 and 4]. Another key factor is "intense metabolic activity" that leads to the production of large amounts of free radicals and lipid peroxidation products [3 and 4]. One of the by-products of cellular metabolism is reactive oxygen species (ROS). When the cell concentration exceeds the limit that can be controlled by immune cells, the ROS could be devastating and cause aging, cancer, neurological diseases, and NIHL [5]. Likewise the prolonged exposure, acute exposure to noise can release a lot of ROSs, such as glutathione peroxidase (GSH-Px), superoxide dismutase (SOD), catalase (CAT), reactive nitrogen species (RNS), etc. [1 and 6]. The ROSs can attack proteins, nucleic acids, and lipid membranes and thus, disrupt normal cellular activities [1, 7, and 8]. Normally, there is an approximate balance between the production of oxygen-derived compounds (antioxidants) and the activity of antioxidant defense system. If this balance is disrupted in favour of the synthesis of oxygen-derived products, oxidative stress is occurred, which leads to biological damage. As discussed earlier, a potential mechanism for the hearing loss due to acoustic overstimulation is production and the creation of ROS particles [9]. Those ROSs that are not removed by antioxidant defense system are expected to damage significantly the sensory cells of cochlea [4 and 9]. Currently, production of noise-induced ROS in the cochlea is well documented. Impaired mitochondrial function and the production of ROS are implicated in many diseases and neuro-degenerative syndrome [4]. Nervous system is more sensitive to the damage caused by ROS [1 and 9]. Ravindran et al. reported that neurotransmitters were increased in distinct parts of the brain due to noise stress during 15 days of exposure [1 and 10]. In addition, it seems that oxidative damage to DNA increases the risk of developing cancer [11]. Exposure to noise, in addition to the free radicals such as malondialdehyde (MDA) as a marker of lipid peroxidation process, leads to increased production of end products of lipid peroxidation [1].

The findings suggest that antioxidants such as GSH increase the sensitivity of cochlea to the damage induced by noise and re-storage of GSH, possibly by increasing the availability of cysteine. This can decrease noise-induced damage to cochlear [5].

The foregoing and the findings on negative effects of noise on organisms and biological systems approve the fact that noise, through oxidative stress, may not only cause damage to the ears but also to the whole body. This review article tries to summarize systematically the findings of the studies that merely focus on the relationship between the negative effects of noise exposure on the release of free radicals that leads to hearing loss. It also discusses the preventive role of antioxidants on NIHL.

Research methodology

This study is a systematic review about the possible effects of antioxidants on decreasing NIHL, conducted in 6 steps, including "framing research question(s) (topic refinement)", "developing the research protocol (work plan)", "systematic searching for evidence", "defining eligibility criteria", "data extraction", "data synthesis", and "reporting and publication". Followings provide a brief description on each step.

Topic refinement

At this step, which was the early stage of the systematic review, the research questions were designed with regards to the study population, intervention, comparisons, results, timing, duration of the study, the outcome of interests, and study plan. The questions were designed in such a way that lead to clear answers.

Research protocol (work plan)

Once formulating the research questions, the work plan was prepared by the researchers, containing the protocols on how to search for relevant literature, inclusion and exclusion criteria, and how to selection the studies, data extraction, data synthesis, and so on.

As the most important prerequisite for internet search, the search keywords ("noise", "free radical", "antioxidants", and "hearing loss", "noise ", and "free radical") and their MeSH terms were defined. Based on which, the search was initiated electronically in credible data bases, including Scopus, PubMed, Elsevier, and ProQuest, and as printed hard copies at libraries. Only publications written in English were included in the study. The research time frame was limited to an approximate period of twenty years from 1993 till date. The archived literature was screened in three phases in terms of title, abstract, and the content of text-body. At each phase, applying inclusion and exclusion criteria, a number of studies were recognized irrelevant and excluded from being further considered. Accordingly, the relevant articles were shortlisted and screened carefully and gradually until the third stage when the list of the archived literature was finalized.

Eligibility Criteria

According to the review protocol, all the interventional (randomized or nonrandomized controlled trials) and observational studies (cohort, case-control, or cross-sectional) that specifically focused on the effect of antioxidants on reducing NIHL were included in the study. In better words, the published peer-reviewed articles and abstracts on animals and humans, written in English, were recognized eligible for inclusion in this review

study. In the initial internet search based on the keywords and MeSH terms and after excluding the duplicates, a total number of 1003 articles were recognized eligible.

Information Sources and Strategy

As mentioned earlier, the electronic search for relevant studies was done in credible databases of Scopus, Pub Med, Elsevier, and ProQuest over the time frame between January 1, 1993 and December 31, 2013. In addition, the reference list of the archived articles was also explored for any additional literature.

Study Selection

The archived articles were initially screened by one expert in terms of title and abstract. Then, the full-text of those articles, whose potential eligibility was approved in the initial screening, was retrieved.

Data Extraction and Assessment of Risk of Bias

The eligible articles were reviewed independently by two experts. If necessary, contradictions and disagreements were resolved in collaboration with the third expert.

Synthesis of Results

Reviewing the full text of the retrieved articles, the content of interest, including antioxidant classification (e.g., vitamins C, E, A, etc.), intake rate (reported in servings, grams, tertiles, or quintiles, etc.), methods of intake measurement (Food Frequency Questionnaire (FFQ), 24-hr dietary recalls or food records (FR), drug records (DR), etc.), research design (e.g., study type, inclusion criteria, type of comparison group), analyses (adjusted or unadjusted for covariates), and the outcome variables, were extracted and transferred as a summary to the appraisal sheets. Also, the effects of free radicals were assorted based on their production level, noise exposure levels (dB), number of hair cell death, level of hearing loss, and frequencies at which the hearing loss was reported. The data were also meta-analyzed by inverse variance weighted method to find possible relationship between type and time of supplementation by antioxidants and incidence of NIHL among the exposed subjects.

Result and discussion

After searching the keywords in the databases and applying the inclusion/exclusion criteria, a total number of 1003 articles were founded in the first round. After primary evaluation, duplicate studies (3 articles) were excluded, and 1000 papers proceed to the next step. After the review of the literature at this step, 876 articles were removed and 124 were enrolled to the next stage. From which, 81 articles were excluded due to the reasons such as "non-occurrence of hearing loss by noise" and "incidence of hearing loss by a factor other than noise exposure", and 43 articles were remained. Two other articles, which were beyond the scope of this study, were also deleted from the list of the archived articles. Finally, after further investigation of full text articles and other previously-set conditions, there were remained only 16 articles. Few of which were about the glutathione antioxidant and its compounds. Due to the small number of these articles, it was not possible to rely on the results of their meta-analysis. Therefore, they were also excluded. Ultimately, 6 studies were remained for the systematic review, in which the vitamins of A, C, and E as well as Magnesium were used as treatment by

antioxidants and preventive compounds from the loss of auditory hair cells. Figure 1 depicts the PRISMA Flow Diagram of the research.

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┌─────────────────────┐
│ Articles searched by │              ┌──────────────────────┐
│   MeSH terms in      │─────────────▶│ Excluded as duplicate │
│ databases (n= 1003)  │              │  articles found by    │
└─────────────────────┘              │ endnote software (n= 3)│
          │                          └──────────────────────┘
          ▼
┌─────────────────────┐
│ Articles retrieved for│             ┌──────────────────────┐
│  further evaluation   │────────────▶│ Excluded after applying│
│      (n=1000)         │             │ the search filters (n=876)│
└─────────────────────┘              └──────────────────────┘
          │
          ▼
┌─────────────────────┐
│ Articles retrieved for│             ┌──────────────────────┐
│ further evaluation (n=│────────────▶│ Excluded abstracts due │
│        124)          │             │  to failure to meet   │
└─────────────────────┘              │ inclusion criteria (n=81)│
          │                          └──────────────────────┘
          ▼
┌─────────────────────┐
│ Abstracts retrieved for│            ┌──────────────────────┐
│ further evaluation (n=│────────────▶│  Full text retrieving │
│        43)           │             │                       │
└─────────────────────┘              └──────────────────────┘
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┌─────────────────────┐
│  Full text articles  │              ┌──────────────────────┐
│ assessed for eligibility│──────────▶│ Excluded full text papers,│
│      (n= 43)         │             │ which were beyond the  │
└─────────────────────┘              │ research scope (n= 2)  │
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          ▼
┌─────────────────────┐
│  Full text articles  │              ┌──────────────────────┐
│ retrieved for further │────────────▶│ Excluded papers (n=25)│
│   evaluation (n= 41) │             │                       │
└─────────────────────┘              └──────────────────────┘
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┌─────────────────────┐
│ Remaining full text  │              ┌──────────────────────┐
│ articles for further │─────────────▶│ Excluded due to the small│
│  evaluation (n=16)   │             │ number of papers on   │
└─────────────────────┘              │ glutathione antioxidants,│
          │                          │ whose meta-analysis are not│
          ▼                          │ statistically possible (n=10)│
┌─────────────────────┐              └──────────────────────┘
│ Remaining final full text│
│ articles for systematic │
│  review and meta-      │
│  analysis (n=6)       │
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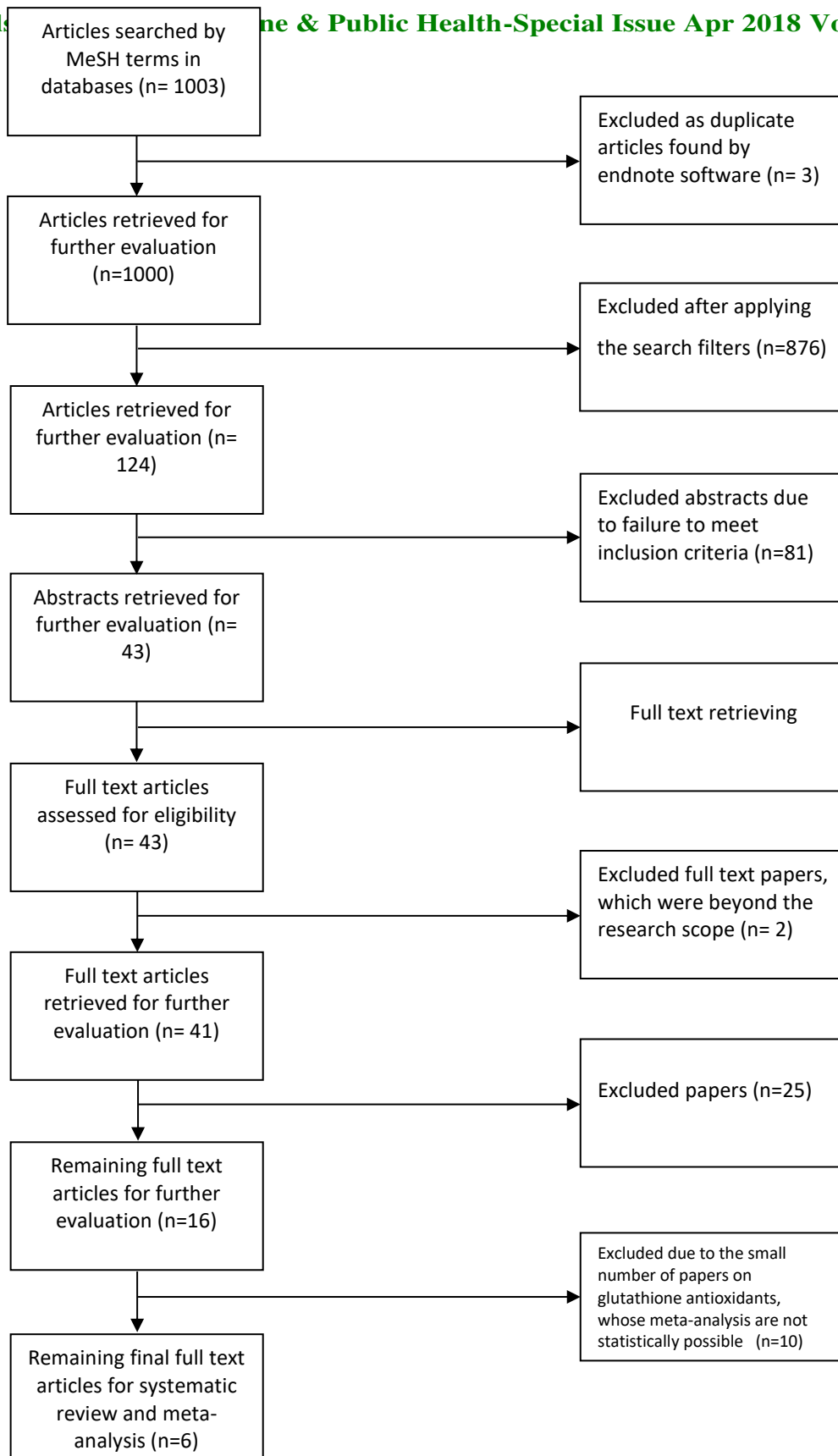
Figure 1: PRISMA Flow Diagram of the research

The data from the papers were used to performed meta-analysis by inverse variance weighted method. Table 1 shows the treatment-response profile of the finalized shortlisted articles, in which the type of treatment, dose of

intake, and time of exposure are mentioned clearly. Profile and level of exposure to noise, type an frequency of applied noise is shown in Table2.

Table 1: treatment-response profile of the finalized shortlisted articles

Code	Author(s)	Date of publish	Type of antioxidant	Dose of intake	Time of administration
01	Le Prell et al.	2007	Vitamins A,C, and E, plus Magnesium	Vitamins A (2.1 mg/kg beta-carotene, P.O.), C (71.4 mg/kg L-Threoascorbic acid, S.C.), and E (26 mg/kg (±)-6-hydroxy-2, 5, 7, 8- tetramethylchromane-2-carboxylic acid, "trolox", S.C.) Magnesium sulphate ("Mg", 2.85 mmol/kg, equivalent to 343 mg/kg, S.C., N=6). The fourth group received a combination of ACE and Mg (at the same doses as groups 2 and 3, "ACEMg", N=6)	beginning one-hour prior to noise exposure and continuing once daily at 24-hour intervals until the day 5 after noise exposure, for a total of 6 daily treatments
03	Yamashita et al.	2005	Vitamin E (trolox)	trolox, 50 mg/kg, i.p., twice daily, and salicylate, 75 mg/kg, S.C., twice daily.	beginning 3 days prior to noise exposure, as well as 1 hour, and 1, 3, and 5 days after noise exposure
04	Le Prell et al.	2011	beta-carotene, vitamins C and E, plus Magnesium	β-carotene (18 mg), vitamin C (500 mg ascorbic acid), vitamin E (305 mg α-tocopherol acetate), and Mg (1949 mg Magnesium	Full daily dose and 6 pills/day(3 pills twice a day)
05	Le Prell et al.	2011	β-carotene, vitamins C and E, plus Magnesium	2.1mg/kg β-carotene. Orally(P.O.) in vegetable oil(2.1ml/kg volume) , vitamin C(71.4mg/kg ascorbic acid), trolox(26mg/kg), Mg(2.85mmol/kg – subcutaneously) Vitamin C, trolox and Mg delivered with a single,6ml/kg injection	Once daily for 5 days
08	Neeru Kapoor	2011	Vitamin E	305mg/kg	Five days
11	Le Prell et al.	2011	β-carotene, vitamins C and E, plus Magnesium	All diets (control and supplemented) contained standard vitamin (10 mg additive per kg chow, AIN-93-VX, vitamin mix TD.94047) and mineral (35 mg additive per kg chow, AIN-93-MX, mineral mix TD.94049) additives. The Control Diet did not provide ascorbic acid. Diet A: β-carotene, vitamin C, vitamin E, Magnesium. Diet B:2.9X β-carotene, 3.1X vitamin E, 1.6X vitamin C, and 1.7X Magnesium	Dietary treatments began 28 days pre-noise exposure, and continued until the end of the study.
14	Nagwa Kostandy Kalleny et al.	2012	vitamins A, C and E, plus Magnesium	Vitamin A 2.1 mg/kg/day Orally, Vitamin C was given in a dose of 71.4 mg/kg/day, Vitamin E was given in a dose of 26 mg/kg/day orally, Magnesium (Mg) was given in a dose of 343 mg/kg/day	continued once daily for five consecutive days
15	Sharon Tamir	2010	vitamins A, C and E, plus Magnesium	Vitamin A was 20 mg/kg, vitamin C was 200 mg/kg, vitamin E was 65 mg/kg and Magnesium was given at a dose of 60 mg/kg. by injection	After the noise exposure, the injections were continued once daily for five consecutive days

Based on the results of the literature reviews, noise exposure increases the amount of free radicals in human body. Production of free radicals takes place through various mechanisms including lipid peroxidation. Free radicals can cause death of hearing cells. As a result, hearing level is declined. At this time, one of the defense strategies of living organisms is to increase the production of antioxidants such as glutathione and its precursor N-acetyl- cysteine (NAC), as well as vitamins A, C, and E. Vitamins A, C, and E, and Magnesium have a role in reducing the loss of hearing cells and also collecting free radicals in the body of organisms.

Table 2: Profile and level of exposure to noise

Study	Lp continuous(dB)	Lp impulse(dB)	Frequency(KHz)
Le Prell et al.	120-5 h	-	4
Yamashita et al.	120-5 h	-	4
Le Prell et al.	-	156	4
Le Prell et al.	110-4 h	-	4
Neeru Kapoor	5 h		4
Le Prell et al.	113-115	-	8-16
Nagwa Kostandy Kalleny et al.	120-5 h	-	4
Sharon Tamir	315-3.5 h	-	18-250

Figures 2 illustrates the relationship between treatment types and NIHL rate frequency and level of noise exposure. In addition, a comparison on the results of auditory brainstem response (ABR) test before and after the noise exposure is demonstrated in Figure 3. According to the figures, the level of hearing loss due to noise exposure directly correlates with the intake dose of antioxidants so that the incidence of NIHL was lower in samples received greater amounts of antioxidants. This was more evident among those treated by vitamins C and E exposed to low-frequency sound levels and by Magnesium at higher frequencies. It is noteworthy that the use of antioxidants, with doses mentioned in the reviewed studies, are more effective in the prevention and treatment of hearing loss, resulting from intermittent sounds at different frequencies. In contrast, the intake dose may be less effective in the prevention and treatment of the hearing loss caused by impact noise and explosions that can cause permanent deafness. Also, the intake time of antioxidants would also be another effective factor. This means that better response will be obtained if the subjects receive the antioxidants prior to the noise exposure. It is better that the subjects take the antioxidants immediately or at least 5 to 7 days after the exposure to noise.
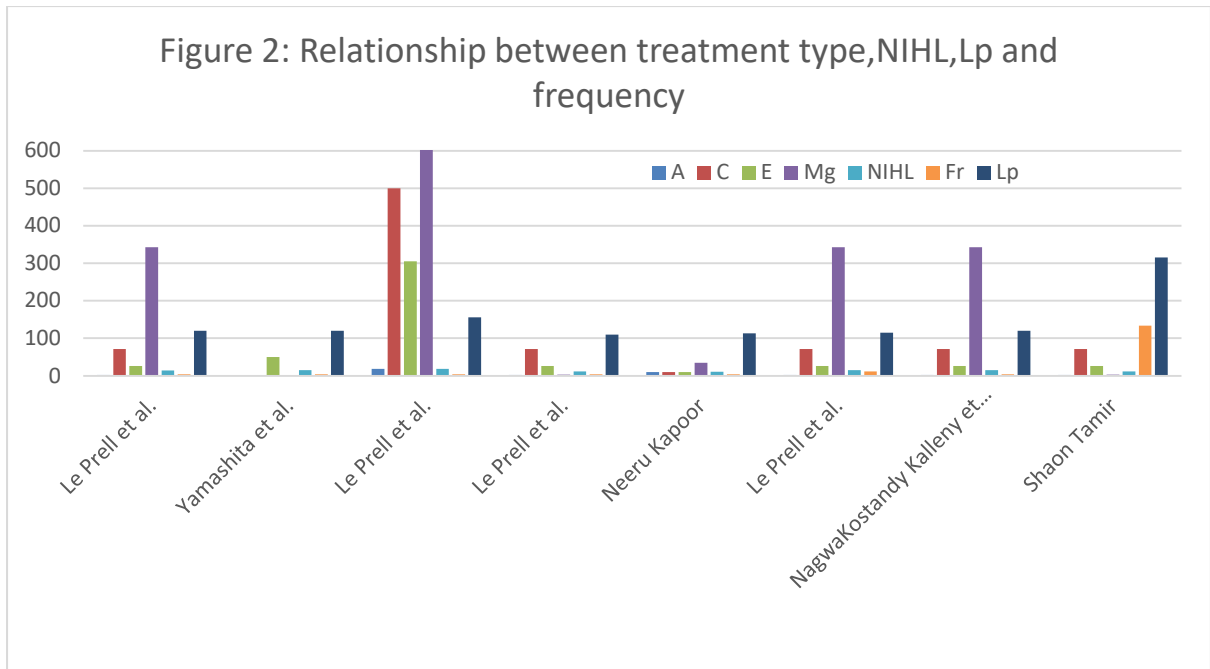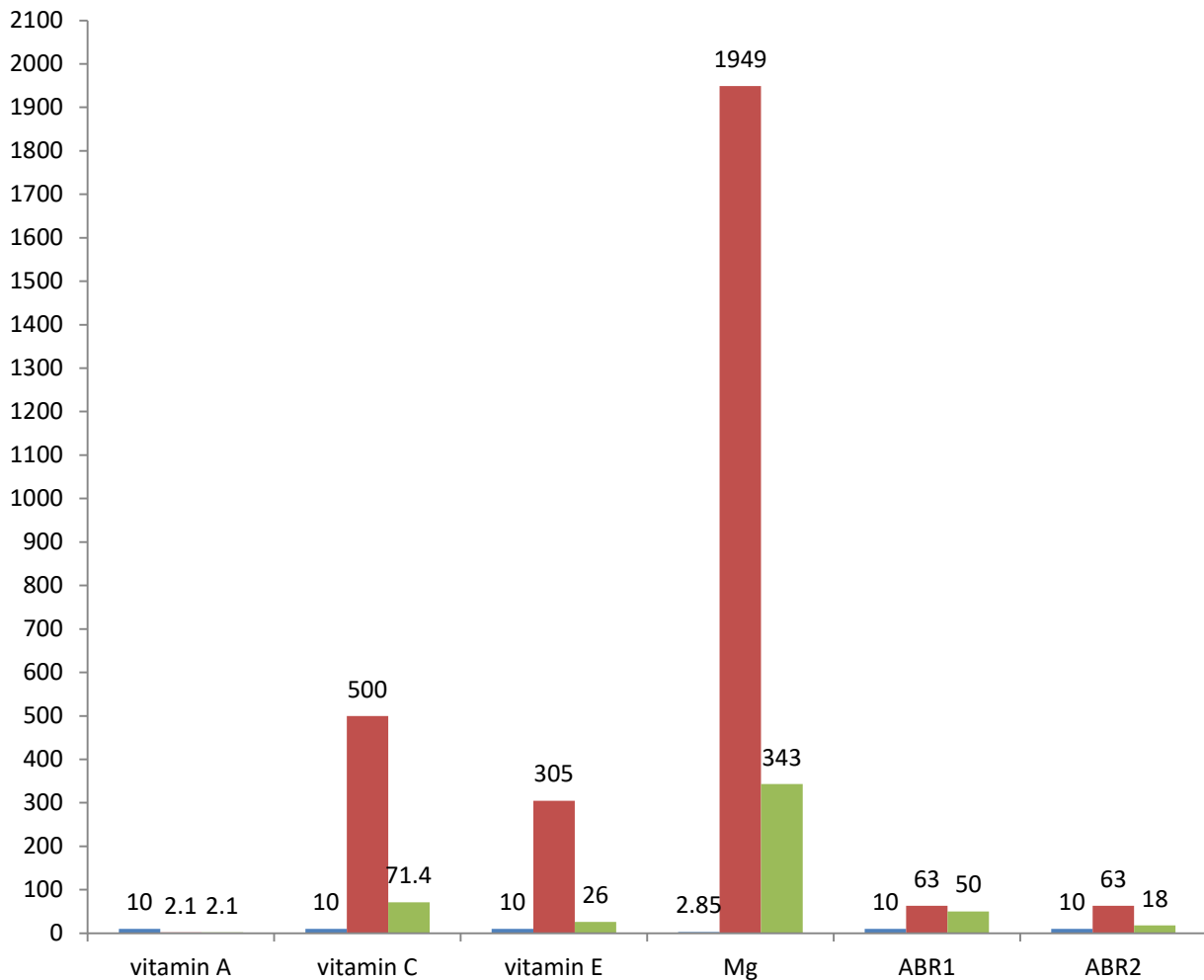
Figure 2: Relationship between treatment type; NILH: noise induced hearing loss; Lp: sound pressure level; Fr: frequency (KHz).

ABR1= pre-noise exposure, ABR2= post-noise exposure

Figure 3. A comparison on the results of auditory brainstem response (ABR) test before and after the noise exposure in different treatments

Conclusion

NIHL is an issue of utmost importance in terms of clinical, social and economic. This clarifies the necessity of attention to its treatment methods. The results of this systematic review showed that oxidative stress contributes to cell death induced by noise and incidence of NIHL. The findings also emphasized that micronutrients and other antioxidants reduce Permanent Hearing Loss (PTS) in mammals. In this regard, the use of micronutrient, in either forms of oral or injected, will be beneficial. When there is no hearing protection equipment, hearing loss can be reduced by the use of antioxidants, which decreases oxidative stress in the inner ear. It seems that combination therapy not only keeps the threshold sensitivity unchanged, but also protects the auditory hair cells. This systematic review showed that the use of antioxidants such as vitamins A, C, and E, and Magnesium is effective to prevent the loss of auditory hair cells and in consequence, the incidence of NIHL. Their combined supplementation will be even more efficient. According to the literature, treatment by vitamin E, with the

purpose of prevention of NIHL, can enhance the response to the treatment by Magnesium. In other words, there is a significant correlation between the consumption of antioxidant vitamins (A, C, and E, and Magnesium) and the loss of auditory hair cells and incidence of NIHL after noise exposure (p<0.001). The prescription and use of Magnesium and vitamins, especially in combination, can reduce the frequency and severity of hearing loss. According to the findings of this study, treatment prior to noise exposure will be more effective and increase the success rate of the control of NIHL.

Acknowledgement

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The effect of aqueous extract of *Lavendula Officinalis* on the ovaries, uterus and sexual hormones of mature female mice (Balb/c)

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Abstract

Background: *Lavendula Officinalis* has different treating effects including sedative and antiviral effects. However, there is no previous investigation on the effect of lavender on reproductive system of females, we aimed to assess the effect of lavendula extract on the ovaries, uterus and sexual hormones of mature female mice (Balb/C).
Materials and methods: This is a pilot experimental trial with convenient sampling. To assess the safety of the decoction of lavendula, 4female mice were injected by the dosage of 18g/kg.bw for 15 days and no death was noted. Therefore, the dosages of 6, 12 and 18 were selected for injection to 65 mice. Mice were divided into 5 groups including 3 experiment, 1 sham and 1control groups. Data were analyzed by Duncan and ANOVA test in SPSS19.P-value<0.05 and 0.001 indicated statistical significance.
Results: Results showed that injecting the aqueous extract of lavendula decreased the large and small diameters of ovary in the first and second experiment groups p<0.05.In the third group, significant increase in the number of primary follicles p<0.05 and considerable decrease in secondary, growing, maturing, graph and corpus luteum were noted p<0.001.The histological changes mentioned that the injection of aqueous extract of lavendula decreased the diameters and thickness of uterine layers including endometer, myometer and perimeter significantly in all experiment groups <0.05 But no significant increase was noted regarding the level of hormones in groups.
Conclusion: it seems that lavendula can be used as a herbal contraceptive method regarding its effect. Although, higher dosage of lavendula may affect the productive system, it seems that it can treat different diseases, Therefore, performing further investigations on its effect by different route of administering and dosages can be recommended.

Keywords: lavender, ovary, uterus, sexual hormones, mice.

Introduction

Herbal remedies have been widely used for treating diseases. Egyptians were the pioneers for using herbal remedies. Recently in most of the countries, the science of herbal remedies has been investigated and Iran provided 85 different and qualified remedies for treating diseases. They were assessed regarding their herbal effects and their probable complications. (1)Nowadays consequent to the complications of using chemical drugs, the application of hairball remedies have been considered (2).
According to their specific geographical location and the possible growth of different herbs in Iran, determining more Herbal remedies and their complications are mandatory. The lavendula can be used for treating different diseases. Lavendula is the genus consisting of 30 different specious from the labiatea family (3).Its' use might reinforce the performance of nervous system and could remit the general weakness and Sleep disorders. However Doral et al mentioned that the compression of its extract could release the pain caused by bruises and wrenches (4) it could decrease the inflammation and burns after insect bite. Homes at all mentioned that aromatic herbal oils such as lavender could be used for treating Alzheimer (5). Its' sedative(6,7) and antioxidants effects were also reported(8) Benblaid et al(9) mentioned that lavendula can be used to disinfect wounds, burns, and insect bites. In veterinary

medicine, it could be used to kill lice and parasites (2) it could also help women menstruation regarding the Linalool (10) and could control diabetes (11).

However in limited reports, dermatitis has been noted as the probable complication of the lavendula contact. Concomitant use of lavendula with some neurologic drugs might increase their sedative and soporific effects. (4) Lavendula officinalis is a wildflower which can be divided into different Categories including essential oils, alkaloids, flavonoids, fennel compounds, tannins and ... based on its chemical structure. The important substantial essence of lavendula were linalool $(C_{10}H_{18}O)$, Acetate- linalool $(C_{12}H_{20}O_2)$ and Cinlele 1&8$(C_{10}H_{18}O)$. (Figure 1).

Figure1: Linalol $(C_{10}H_{18}O)$ (A), Asetat- linalool $(C_{12}H_{20}O_2)$ (B) and Cinlele 1&8 $(C_{10}H_{18}O)$ (C).

As, many women use diverse herbal teas to prevent pregnancy as a contraceptive factor and there is no previous investigation on the aqueous extract of lavendula on reproductive system of females, we aimed to assess the effect of lavendula extract on the ovaries, uterus and sexual hormones of mature female mouse(Balb/c).

Materials and methods

This is a pilot experimental trial with convenient sampling. Ethical approval was obtained from department of biology, faculty of basic sciences, Karaj Islamic Azad University (number: 106124).During intraperitoneal injection, the health qualifications were adjusted and no problem was noted for mice. During blood sampling, mice were completely unconscious and they felt no pain.To provide the aqueous extract of lavendula, the flowering branches were collected. Researchers dried them in a dark and dry condition and grounded them with electric mill. Then, 30 grams of this powder were added to 300 milliliters of boiling distilled water. The resulting suspension was left for 10 minutes and brewed like a tea. After an hour, it was set at a 50 degrees centigrade on magnetic hot plate (IKA, Germany) to boil slowly. The Decoction was percolated by sterile gauze and then was percolated by the Wattman filter paper No. 4. The solution was centrifuged at 4,000 rpm for 20 minutes. (Hettich, Germany). The solution was percolated again and condensed to 20 milliliters at 50- 60 degrees centigrade. In this step, 1.5 grams of the powder were existed in each milliliter of solution. To assess the effect of aqueous extract of lavendula on ovaries, uterine and sexual hormones of matured Balb/c mice, the dosage of LD 50 was indicated as a lethal dose for female mouse. To assess the safety of the decoction of lavendula, 4 female mice were injected by the dosage of 18g/kg/bw for 15 days and no death was noted. Therefore, the dosages of 6, 12 and 18 were selected for injection to 65 mice. The laboratory mice were bought from the Razi Vaccine and Serum Research Institute and were kept in Karaj Azad University on specific light, temperature and the humidity. The light period included 12 hours of light and 12 hours of darkness. The room was adjusted by 22 degrees centigrade and with 50% of humidity. Samples were female mice aged 10 weeks with 24-26 grams. They were randomly divided into 5 groups. Group 1 (15 mice, extract plus 6g/kg/bw LD), group 2(15 mice, extract plus 12g/kg/bw LD), group 3(15 mice, extract plus 18g /kg/bw LD), control group (10 mice, no injection) and sham group (10 mice, distilled water was injected) .Periodic Intraperitoneal injection in both sides of the body (One day right and the next day left). The injections were performed for 12 days after the fresh extraction. All mice were dissected gently the day after finishing injection to extract the ovaries, uterus and oviduct. They were washed by physiologic serum and Formaldehyde solutions were used as a fixative for microscopy. After complete fixation, dewatering, transparent process, colonizing and sectioning were performed by microtome. Then, Samples were colored with eosin and hematoxylin and the slides were prepared for assessment. For assessing the hormonal changes, the blood samples were taken from chest and heart. The serums were centrifuged and separated at 3000 rpm in 5 minutes and were assessed by Waidas kits to assess serum estradiol and progesterone by Enzyme linked fibrinolytic assay method (ELFA). Data were analyzed by Duncan and ANOVA test in SPSS 19. P-value<0.05 and 0.001 indicated statistical significance.

Results

Results showed that injecting the aqueous extract of lavendula decreased the ovarian size significantly. The decrease in large diameter of ovaries was noted in all 3 experimental groups and first and second groups noted significant decrease in small diameter. (figure2, graph1) As, No difference was noted between the fourth and fifth groups regarding the ovarian graphs, the 1-4 groups were compared and shown in figure 2).
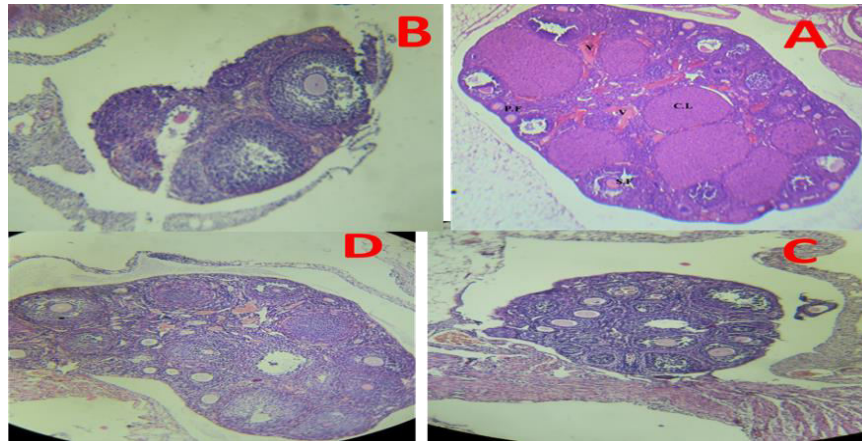

Figure 2: histological ovarian changes of the experimental and control group.(×40)
Control (A), group 1(B), group 2(C), and group 4(D).
V: vessel, CL: corpus luteum PF: primary follicle, SF: secondary follicle

Primary follicle   secondaryfollicle   growing follicle

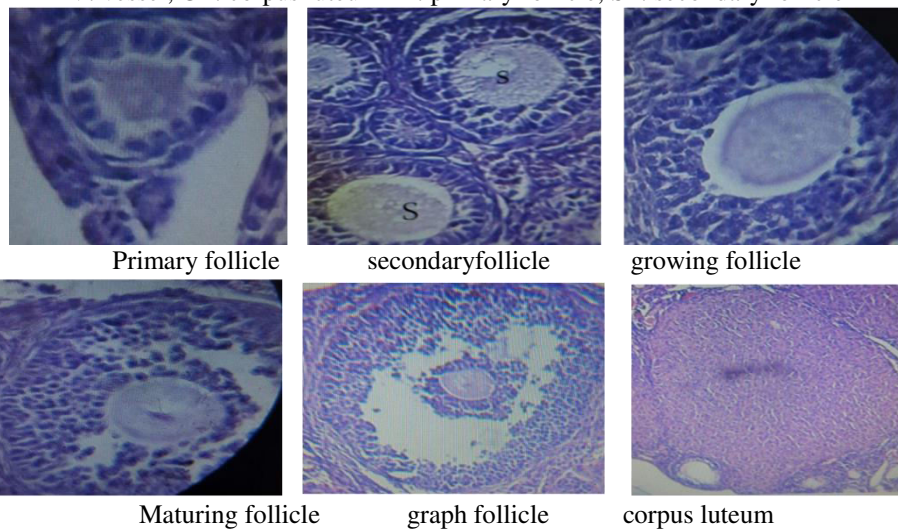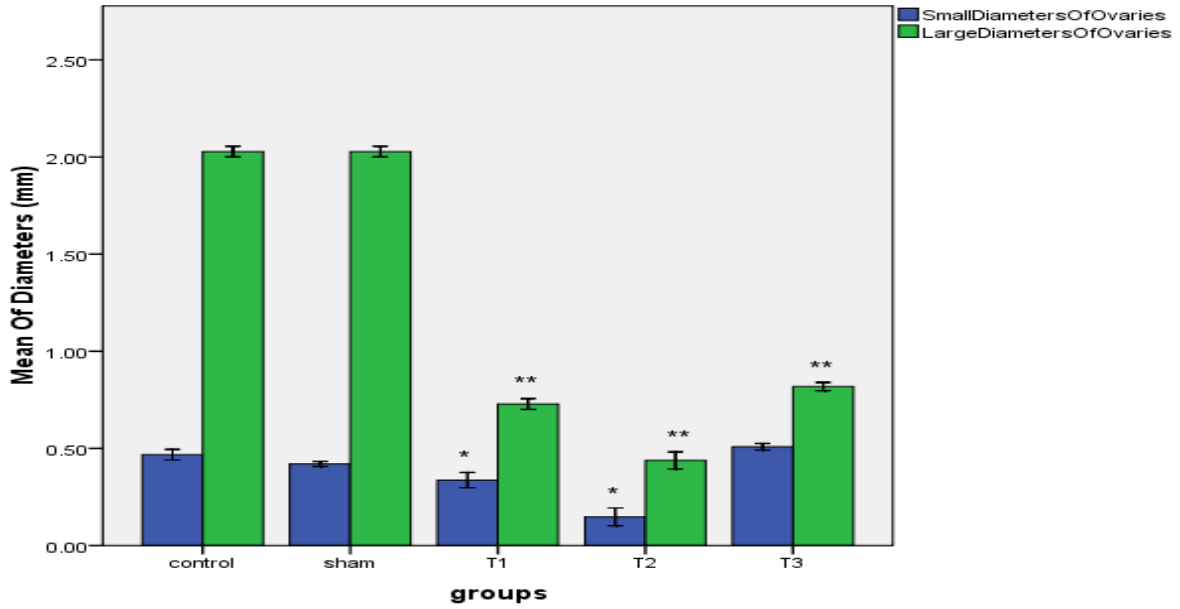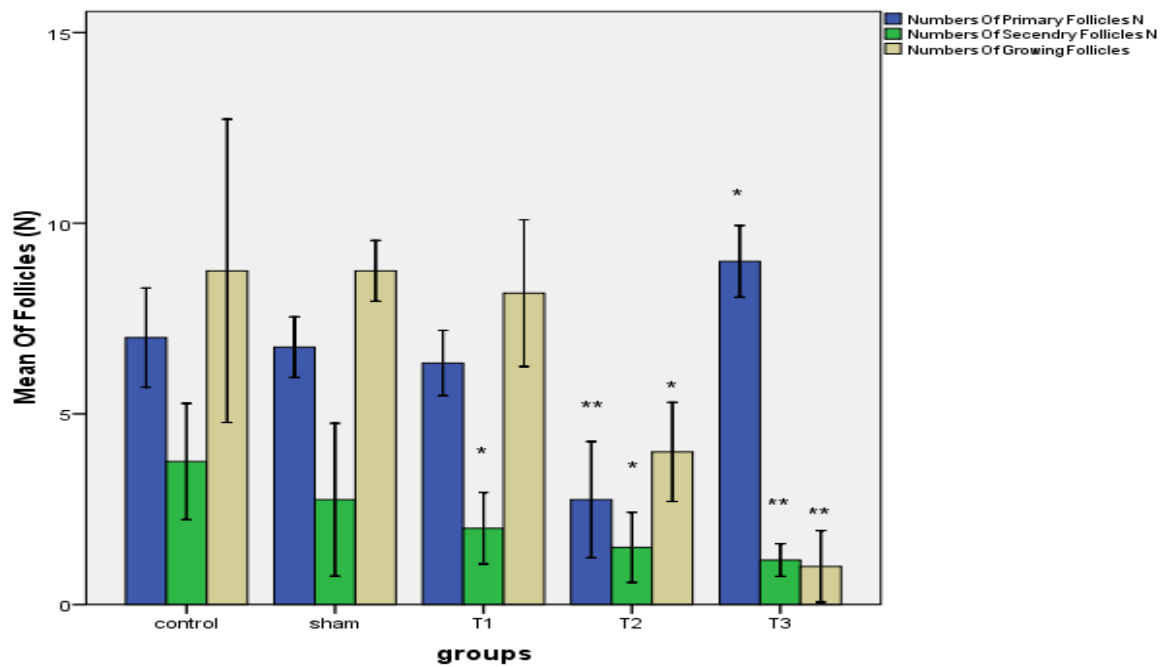Maturing follicle   graph follicle   corpus luteum
Figure 3: microscopic images of primary follicle, secondary follicle, growing follicle, maturing follicle, graph follicle and corpus luteum of control group (×400)
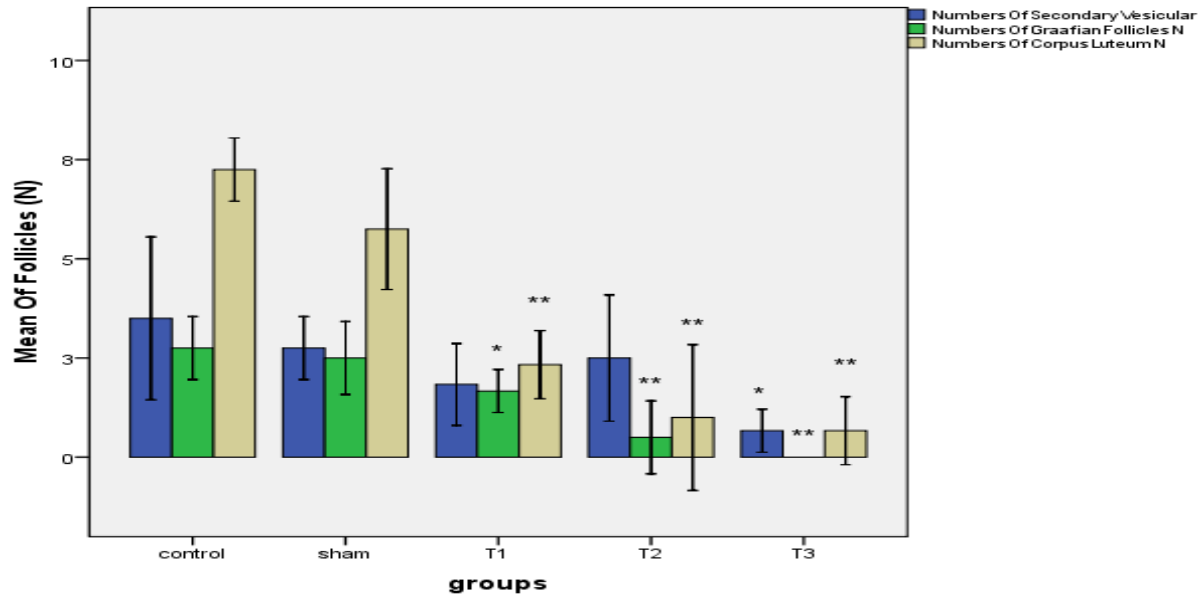
Graph 1: comparing the large and small diameters of ovaries in groups

Graph 2: comparing the number of primary follicle, secondary follicle, and growing follicle in groups.

Graph 3: comparing the number of maturing follicle, graph follicle and corpus luteum in groups

Results mentioned significant decrease in uterus diameter by the injection of aqueous extract of lavendula in all experimental groups. (Figure 4, graph 4) after injection, each ovarian cornuate was tapered and probably lost their ability to reproduce. Furthermore in experimental group, internal bleedings in different parts of ovarian cornuate were mentioned. Regarding the similarity of results between 4th and 5thgroups, figure 4 compared the experiment groups with the control one.
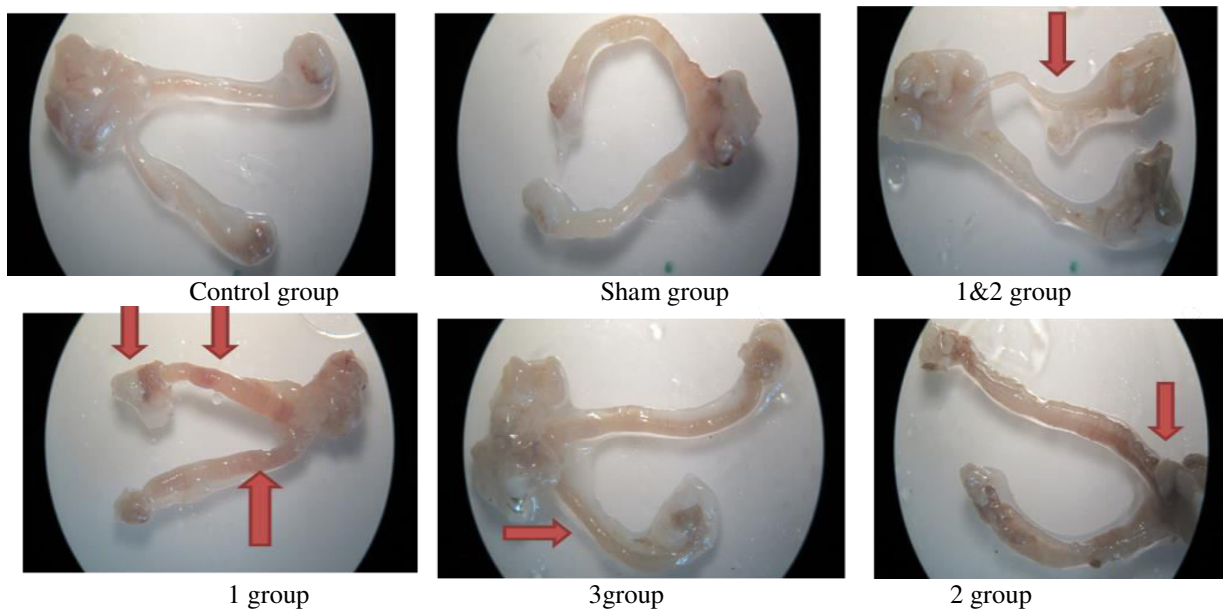
Figure 4: bicornuate uterine in experiment and control groups (X11.5)
The uterine was tapered in first and second groups, 4thgroup
Control group, Group2: internal bleeding, Group3: decreased uterus thickness, Group1: internal bleeding

Assessing the uterine diameter, results showed that the large diameters in all groups were decreased but there was just significant difference between third group of experiment with 4thand 5thgroups. (Graph 4)
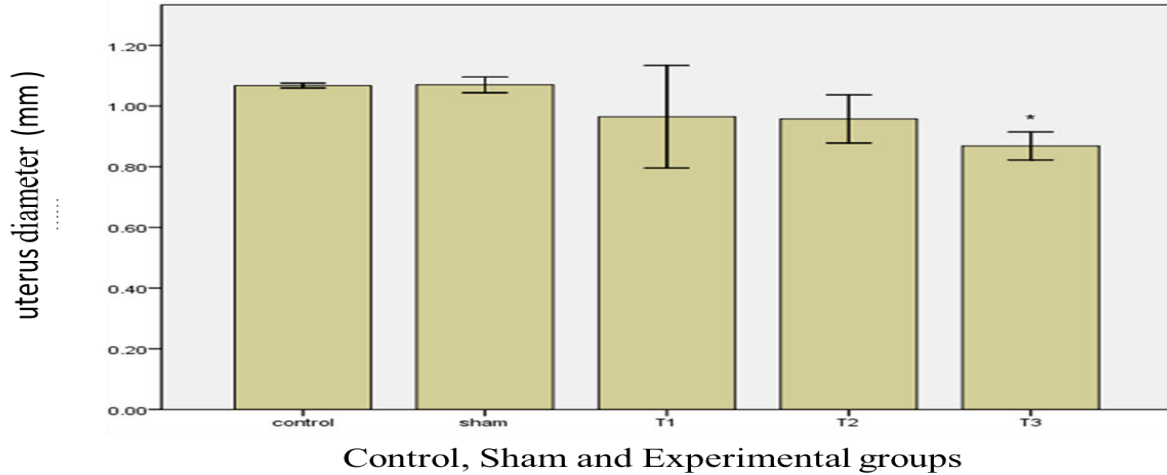
Graph 4: comparing the uterus diameter in groups

The histological changes mentioned that the injection of aqueous extract of lavendula decreased the thickness of uterine layers including endometer, myometer and perimeter in all experiment groups (figure 5, graph 5).
Endometermyometer perimeter
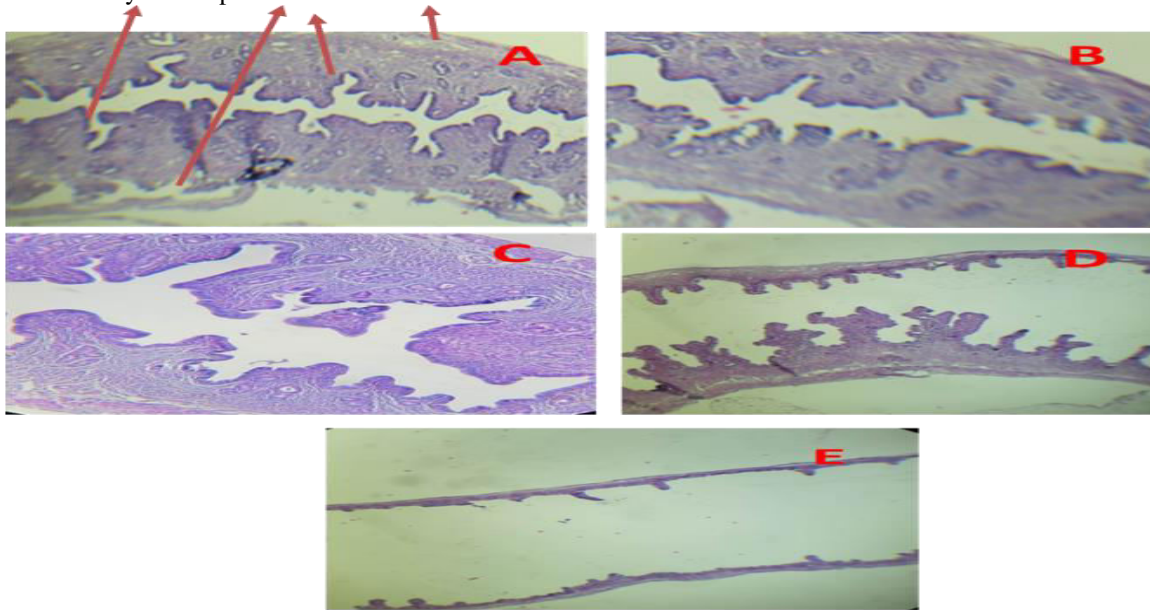
Figure 5: the microscopic view of uterine tissue.(×40)
Control (A), group 4(B).group 1(C), group 2(D), and group 3(E)
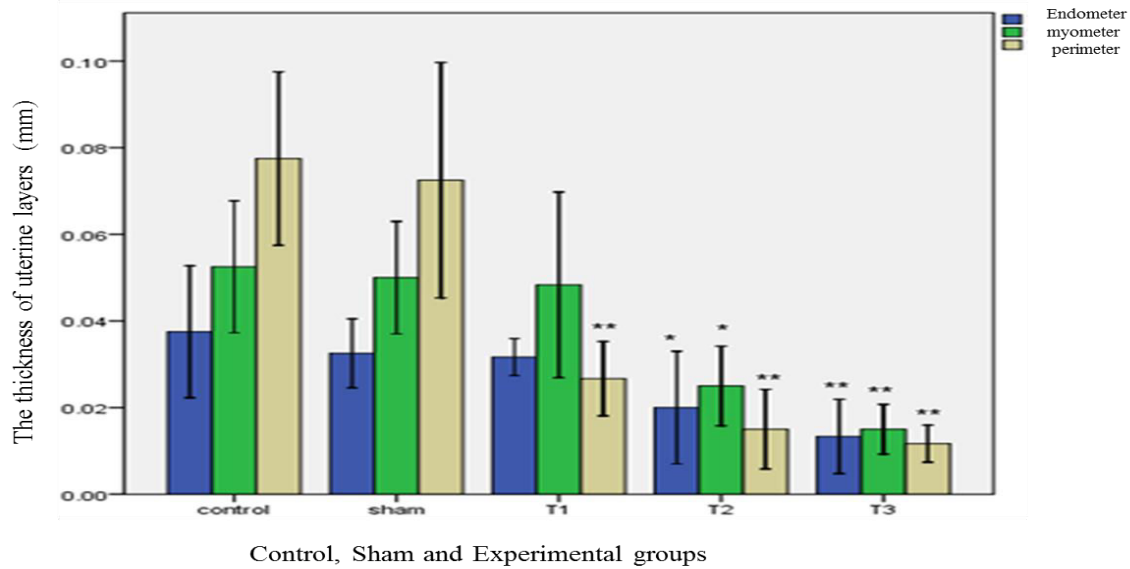
Graph 5: comparing the endometer, myometer and perimeter of uterine in groups

To assess the changes in estradiol and progesterone, results mentioned increased estradiol level and decreased progesterone level in all experiment groups but no significant difference was noted comparing control and sham group (graph 6).
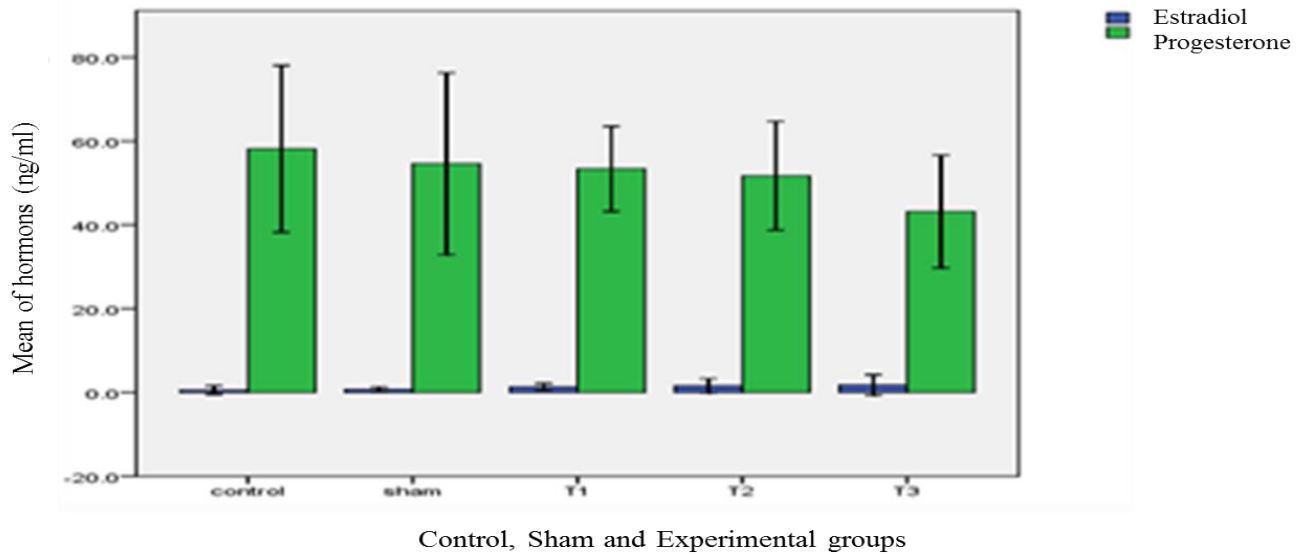
Graph 6: The changes in estradiol and progesterone levels in groups.

Discussion

Histological changes as decreased ovarian size were noted in this study which was shown by the decreased size of large and small diameters of ovary in groups 1 & 2. (Figure 2, graph 1). Decreased ovarian size occurred as a result of decreased number of Graph follicles and corpus luteum (graph 3). Although, Progesterone can prevent the growth of follicles and ovulation and prepare the endometer for conceiving pregnancy and fetal maintenance, the decreased progesterone level in experiment groups might be noted as a result of other factors.

The decreased levelof progesterone in group 3 might be noted consequent to the multiple growth of primary follicles. Also, the decreased growth of primary follicles in group 2 might be noted as a result of multidimensional effects of the lavendula. Therefore, it seems that the application of this herb for fertility or infertility should be completely under control of an expert physician.

Furthermore, regarding the ovarian stimulation occurred by using lavendula, polycystic syndrome might be noted which increased the primary follicles significantly. As, these follicles could not release easily, they could induce infertility.

Rashidi et al which assessed infertile women with poly cystic ovarian syndrome, mentioned poly cystic ovarian syndrome as the leading cause of anovulation and infertility. They mentioned that the excessive use of lavendula could deteriorate the pregnancy process.(10) Golestani kalat et al which assessed the effect of lavendula essence on insects, mentioned lavendula as a sparing prohibitory and the F1 insects population suppressor which was consistent with previous study.(11,12) Torabzadeh et al demonstrated that alkaloids might decrease the interorgan fluids and organ volume of liver, kidney, adrenal and uterus (13,14).

In this study, results showed that the number of secondary, growing and graph follicles in experiment groups were significantly lower than control and sham groups. Therefore, it seems that the aqueous extract of lavendula might decrease the inter follicle fluid and prevent the production of graph follicles. The inability of ovaries for maturing the oocytes in all dosages indicated significant decrease in graph follicles. Also, regarding the number of graph follicles, no graph follicle was noted after the injection of 18 kg/bw.

Despite the different sample sizes of Golestani kalat et al and our study, consistent results were noted.In all samples by the significant decrease in the number of corpus luteum and ovarian size regarding the decreased rate of ovulation. The histological changes including the decreased diameter of uterus and endometer, myometer and premeter layers of uterus were noted in experiment groups.

Progesterone is the leading factor for the strength of uterus layers which prohibit further ovulation. Also, appropriate level of estrogen is needed for preventing the menstruation and maintaining the pregnancy. In all experiment groups, the significant changes in size and thickness of uterus wall and the decreased endometrial layers were noted. Also, the inappropriate estradiol level (estrogen) and progesterone were noted as the factors disturbing successful pregnancy process.

As estrogen is the principal hormone for cell proliferation and endometrial reconstruction (15), results showed that respectively 6, 12, and 18 g/kg.bw of injection gradually disrupted the sexual cycles and induced significant decrease in endometer, perimeter and myometer thickness during ovulation. The significant decrease in uterus diameter by the dosge of 18/ kg.bw regarding the decrease in endometer, perimeter and myometer occurred as a result of decreased level of progesterone. Since, the thickness of uterine layer depended on both estrogen and progesterone.

Drek et al mentioned that lavendula oil might cause the gynecomastia in boys, as the gynecomastia depends on the increased estrogen, results were relatively similar with our results.(16) However, Valerie et al mentioned that consuming 20-100 mg kg lavendula oil with skin absorbance in immature mice did not have estrogenic activity. (17) This different result might be as a result of different method of application. They assessed the skin absorbance and less lavendula might be released in blood, but in this study theinter peritoneal injection was performed and higher density of lavendula was released in serum.

According to the decreased level of progesterone, the excessive use of this herb might induce abortion and infertility.

The increased level of estrogen suppress the secretion of FSH from hypothalamus and hypophysis and it might be indicated as a risk for the growth of dominant follicle. Clinically, the increased level of estrogen might led to chronic anovulation which could be seen in polycystic ovarian syndrome. Otherwise, progesterone prohibit the contraction of myometer smooth muscles, these contraction disrupt fetal implantation. Therefore, regarding the decreased level of progesterone in in all experiment groups and the inappropriate conditions for implantation, the fertility rate decreased.

Sormaghy et al showed that lavendula could induce menstruation and bleeding regarding the linalool. (18) Which was consistent with this study.

Conclusion

It seems that lavendula can be used as a herbal contraceptive method regarding its effect. Although, higher dosage of lavendula may affect he productive system, it seems that it can treat different diseases, Therefore, performing further investigations on its effect by different route of administering and dosages can be recommended. This herb can be a right medicine for contraceptives and anticancer.

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Comparing the Effects of Consistent and Inconsistent Physical Activities on Decreasing the Symptoms in Students Featuring Attention Deficit/Hyperactivity Disorder Syndrome

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Abstract:

This study was aimed at comparing the effectiveness of consistent versus inconsistent physical activities in patients with attention deficit/hyperactivity disorder syndrome for decreasing the symptoms of such a disorder.

To do so, a sample consisting of 75 individuals who were assigned to three groups, and selected based on randomized clustering method involving students with attention deficit-hyperactivity disorder syndrome in the city of Tehran, one empirical group consisting of 25 individuals who were subjected to Pilates physical activities as well as 25-people group who was assigned the task of a highly dynamic game (football) and the third group included 25 individuals who were not subjected to any physical activity.

The required information was collected by making use of SNAP-IV questionnaire and child behavior checklist (CBCL) administered to students ranging from 6 to 18 years. To analyze the data, besides the descriptive statistics, inferential statistics were used. These include multivariate covariance analysis (MANCOVA), the regression coefficients homogeneity default tests, intergroup variance homogeneity default test through taking advantage of the Levin test and Shapiro-Wilk test in order to evaluate the data distribution normality. The results indicated that there is a significant difference between the effects of consistent versus inconsistent physical activity in patients featuring attention deficit/hyperactivity disorder syndrome (a highly dynamic ball game and Pilates) regarding a secondary type of hyperactivity and a combined type of attention deficit/hyperactivity.

Based on the results, although both physical activities are effective in improving the symptoms of disorder, the extent to which the symptoms are decreased in secondary type hyperactivity and the combined type of the disorder is found higher in inconsistent physical activity with disorder signs (Pilates) than in consistent physical activity with disorder signs (highly dynamic ball game).As for the attention problems, the reductions in the scores in consistent physical activity with disorder signs is higher than in inconsistent physical activity with disorder signs.

Keywords: attention deficit/hyperactivity disorder syndrome (ADHD), consistent physical activity featuring attention deficit/hyperactivity disorder syndrome (highly dynamic ball game), inconsistent physical activity featuring attention deficit/hyperactivity disorder syndrome (Pilates)

1. Introduction:

Attention deficit – hyperactivity disorder (ADHD) is a developmental disorder affecting attention, impulsion control, restlessness and behavior direction and it stems from grave neurological, sensational, dynamic or emotional disorders (Harvey, Grizenko, 2007). The disorder emerges in preschool period and become chronic and persistent

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during the course of time and it is considered as a strong risk factor for the later behavioral problems appearing in primary school age (Dali, 2006). It causes a great number of students to suffer considerable from problems in terms of their educational, cognitive, social, and emotional functions (Stephan, et al, 2009); in such a manner that the chronic type of such a disorder severely interrupts the children performance at school (Davids and Gosper, 2005; Faindling, 2008). Children with attention deficit-hyperactivity disorder syndrome might be prone to the risk of motor, cardiovascular, hypertension diseases as well as high level of cholesterol due to having a low level of physical readiness and the weakness in motor performance. Furthermore, low level of physical readiness as a result of not performing continuous exercise leads to the deterioration of self-esteem and this, in turn, brings about the grounding for a reduction in participation level. Moreover, there is also the possibility of ADHD co morbidity with other disorders like anxiety, depression, drug abuse in lower ages, aggression and so forth (Davids and Gosper, 2005); motor skills and balance are considerably lower in children with ADHD, as a complex brain disorder, than their normal counterparts (Killing et al, 2008).

The diagnosis and the treatment of such a disease are of great importance because it is associated with high risks of criminality, drug dependence, conduct disorder and oppositional behaviors. Studies have shown that 35% of the children with ADHD exhibited oppositional behavior disorder, 25% of them have conduct disorders, and most of the families with such children suffer from discomposure (Bakhshi, 2011). Therefore it is highly important to place emphasize on the evaluation, identification and treatment of such children in schools (Barkley, 2006; De Paul and Power, 2008). Therapeutic intervention results in temporary treatment of its symptoms (Solanto, et al, 2001) while long-term irrational use of the drugs causes pertinence (Mool, et al, 2001).It has been shown that there is a close relationship between physical activities and improving behavioral disorders. Motor exercises are among the interventions that lead to the improvement of executive functions (Hillman, et al, 2008; Medina, Netto and Moscat, 2009; Hoykins and Buchi, 2010, Gapin and Atnir, 2010), cognitive, educational and attention functions as well as negative behaviors (Pantifex, 2011). Such treatments also cause an increase in self-regulation abilities and reduction in the prominent signs and co morbid disorders in children (Hufner et al, 2006; Sivasankaran et al, 2006). One of the mechanisms that could be used for justification for the improvement of cognitive function after doing physical activities is neurotrophic or neurotic nutrition with elements such as development factor of insulin (IGF1) and the neurotrophic factor derived from brain (BDNF) which leads to the production of vessels (production of new capillaries), neurogens (production of new neurons), cellular reproduction, and neurotic plasticity (Wenman and Gomez-Pinilia, 2005). It has also been reported physical activities are possible mechanism that might lead to brain blood flow (Corido and Shill, 2007; Pearira, et al, 2007). It was therefore recommended that somatic-physiological approaches should be taken into consideration (Brown, 2013). Based on studies that showed positive effectiveness of physical activities in decreasing attention deficit, it was highlighted that certain physical activities can have better effect on children. These includes activities that have an aligned characteristics with the symptoms of the disorder (those based on high endeavor and emerging consuming) or those which do not have aligned characteristics with the symptoms of the disorder, i.e. those based on focus and attention. High dynamic ball sport such as football are included in the group that have an aligned characteristics with intrinsic symptoms of the disorder while Pilates sport on the other hand is known as collection of harmonies between the body, mind, and soul; is considered in the group of activities that do not have aligned characteristics with the intrinsic symptoms of the disorder. Pilates is an exercise program that was founded by Joseph Pilates in 1930 and regarded as "The science of body controlling" (Contrology). This fitness program takes advantage of the three principle of power, balance, and stretching to incorporate movements which focus on the improvement of the flexibility and power in all the organs. The main principles of Pilates are: focus, control, attention, breathing, and movement all of which work with the alignment of body and mind. Pilates exercises will improve muscular power and balance as well as improving the flexibility of the body and scope in which joints can be moved. Pilates movements leads to improved power and balance in the body too. Performing Pilates is associated with excellent outcome and its use in individuals, from any age group and gender with any sort of special condition has transformed this unknown sport to a complementary public sport method. Pilates its collection of specialized movements engages both the body and the mind. Doing contrology exercises causes one to gain control over his or her entire muscles. In fact, contrology means creating a sort of complete coordination between the human body, mind and soul in such a manner that the individual gains complete control over its body through taking advantage of methods posed in contrology and then achieves some sort of natural harmony via repeatedly performing its moves and gradually acquiring mastery Therefore constrative analysis of the effectiveness of these two different groups of physical activities and its practical results which distinguish it from earlier studies can be useful in adopting decisions when it comes to developing proper physical activity for the .

Therefore, contrastive analysis of the effectiveness of these two different groups of physical activities and reaping its practical results as distinctive features distinguishing this study from the prior studies, can be useful in adopting decisions regarding the treatment of the children suffering from ADHD. This is one of the innovative aspects of the present study showing its importance and necessity. In fact, this study is an attempt to examine the hypothesis that there are significant differences between the effects of consistent versus inconsistent physical activity in patients featuring attention deficit/hyperactivity disorder syndrome (a highly dynamic ball game and Pilates) on decreasing the ADHD symptoms.

2. Methodology:
2.1. Participants:

The Study population includes all of the students with ADHD from the schools in the city of Tehran and within a time span from 2015 to 2016 educational year. The study sample includes 75 individuals assigned to three subgroups: one empirical group, consisting of 25 individuals who were subjected to Pilates physical activities, another 25-people group were assigned the task of a highly dynamic game (football), and the third group included 25 individuals who were not subjected to any physical activity. The present survey is based on a randomized multistage clustering method. Based multistage clustering sampling method, five schools were selected from all of the Education Ministry Districts in the city of Tehran. Each of the schools had six grades of which the grades two and three were selected randomly and then the entire 616 students schooling in grades two and three of the five schools were administered with a SNAP-IV questionnaire with the objective of screening for ADHD and the students with high scores in ADHD were selected after which the (6-18 year old) child behavior checklist was implemented on them. Then, the 80 students who had scored high in both of the study instruments were interviewed based on clinical surveys and finally, 75 students were diagnosed with ADHD. These 75 students were assigned to three groups and then they were stochastically pinpointed as experimental and control groups.

2.2. Research Tools:
The required information was gathered by means of SNAP-IV questionnaire and Child Behavior Checklist (CBCL) administered to students aged 6 to 18. SNAP-IV rating scale was first arranged by three scholars named James M. Swanson, Nolan, and Pelham in 1980 by rewriting the DCM criteria and the acronym SNAP has been derived of the initial letters from the name of the researchers who made it. At the same time with revising DSM and codification of the DSM-IV criteria, the aforementioned scale was also rewritten (Sadr Al-Ssadat, Seyyed Jalal et al, 2007).

The Implementation and scoring method: This questionnaire contains 18 questions: the first 9 questions pertain to diagnosing the attention deficit disorder (ADD) and the last 9 questions concern the diagnosis of hyperactivity disorder (HD). Hence, three types of diagnosis are possible via making use of this scale: combined type, predominantly attention deficit type and predominantly hyperactive type. The answers are scored based on Likert's scale from 0 to 3. The scoring method is in a way that every individual can get a maximum score of 18 and it is divided by 9 in each of the subscales. The cutoff points in the entire scale and each of the ADHD subscales were 1.57, 1.45 and 1.9, respectively (Sadr Al-Ssadat, Seyyed Jalal et al, 2007).

Validity and Reliability: Criterion validity was 0.48 and this test has 3 criteria based on factor analysis that in general account for 0.56 of the variance. Content validity is also approved by the experts. The retest reliability coefficient is 0.82, the Chronbach's Alpha is 0.90, and the split coefficient equals 0.76 (Sadr-Al-Sadat, Sayyed Jalal et al, 2007).

The Child Behavior checklist (CBCL): It has to be completed by the parents and/or any individual who taught the child and takes care, and know the child completely respectively. This form has several parts: the first page covers the demographic information regarding eh child as well as the individual who completes the form. In the next section, questions and phrases pointing to the child's competencies and adaptive functions (activities, social aspects, child's school problems and overall competency) were analyzed while third section includes a list of 113 expressions under the title of experience-based scales regarding the child's problems (anxiety/depression, isolation/depression, physical complaints, social problems, thinking problems, attention problems, law-breaking behaviors, aggressive behaviors, internalization and externalization problems) and the replier was to provide answers according to the child's status during last 6 months to each of the questions in the form of 0= incorrect, 1=

somehow or sometimes correct, and 2= completely or often correct (Achenbach, Reskurla, 2001; cited from Mina'ee, 2006, Achenbach, Reskurla, 2007).

Implementation and scoring method: Child Behavior Checklist is mostly completed in 20 to 25 minutes and the results in three areas of competence and adaptive functioning, experience-based scales, as well as DSM-based scales (affective problems, physical problems, anxiety problems, and problems connected with attention deficit disorder/hyperactivity, oppositional behavior and conduct disorder) were accumulated and scored. The scores took one of the following three forms: raw scores obtained via summing the scores 0, 1 and 2 acquired for each of the questions from each of the scales. The summed percentage is indicative of the individual's ranks in each of the scales and T-scores which are the better performance indicators. This provides the possibility of interpersonally assessing the individual's affective, behavioral, social and competency problems. The raw scores are most frequently used in statistical analyses and for the purpose of interpersonal comparisons while the T-scores and percentage ranks are better used for intrapersonal comparisons by the authors. Due to their being scored quantitatively, DSM-based scales are used for assessing the problems as well as the improvement derived from the interventions (Achenbach, Reskurla, 2001; cited from Mina'ee, 2006, Achenbach, Reskurla, 2007).

Validity and reliability: Achenbach and Reskurla (2007) reported a total (6-18) CBCL validity coefficient of 0.97 using Cronbach's alpha and it was reported to be 0.94 by retest reliability. In the study performed by Mina'ee (2006), the Cronbach's alpha coefficients for the sub-indices have been reported as follows: competency and adaptive action scales' Alpha coefficients in a range between 0.91 and 0.65 and the DSM-based scales' alpha coefficients were mostly satisfactory and favorable in a range between -0.92 and 0.62. Furthermore, Cronbach's alpha coefficients of the subscale covering the problems pertaining to ADHD disorder were between -0.92 and 0.78. Also, Achenbach and Reskurla (2007) state that based on the information and the evidences presented regarding the content validity (selecting the questions' rationale and analyzing the questions based on a classic method), criterion validity (via psychiatrist interview with the child as well as the correlations with CSI-4 scale) and the construct-validity (scales interrelationships and groups differentiation), it was concluded that CBCL is a valid instrument for assessing the emotional-behavioral problems and the users can be sure to take advantage of it.

2.3 Data Collection Method
The methodology used in the study is based on experimental method in the form of pretest and posttest in which the study sample volume were selected based on a randomized method and assigned to two control and experimental groups. To make sure of the ability to implement independent variable in 90-minute sessions, the research plan was initially pilot-executed in two sessions and the ability to run the plan was proved.

2.4 Statistical Method
In order to analyze the data, inferential statistics including multivariate analysis of covariance (MANCOVA), together with default test of regression coefficients homogeneity regarding the study hypotheses, default test of intergroup variance homogeneity regarding the study components through taking advantage of Shapiro-Wilk test and Levine test which determined the data distribution normality in addition to descriptive statistics.

3. Results
The study hypotheses were investigated according to the study objectives and the following results were found: In order to perform a comparative elucidate the effects of consistent versus inconsistent physical activities in students with ADHD on decreasing the symptoms thereof, initially a default test of regression coefficients homogeneity and the default test of intergroup variance homogeneity were carried out using Shapiro-Wilk test and Levin test to evaluate the scores' distribution normality. Then, multivariate covariance analysis (MANCOVA), (table 1), along with multivariate covariance analysis significance tests (MANCOVA) were used. As a result of the calculated F-value on the basis of ADHD, it was shown to be insignificant in a 0.05 level in the groups-pretest interaction (0, 05 < P). Therefore the assumption of homogeneity of regression slope holds and as the correlation coefficients between the components of the disorder problems (ADHD) in pretest and posttest, are higher than 0.6, so the multivariate covariance analysis was used to analyze the study data.

As Levin's F-value is not significant at α= 0, 05 (0, 05 ≤P) meaning the assumption of homogeneity of variance holds. Based on Shapiro-Wilk test results, the values obtained in a group are not significant in a 0.05 level so the equality condition of inter-group variances and data distribution normality hold. The results of multivariate covariance analysis (MANCOVA) significance test in the two study groups showed that the all tests' significance levels allow the ability to make use of multivariate covariance analysis (MANCOVA).

Table 1: the results of the multivariate regression analysis regarding the effect of consistent versus inconsistent physical activity in ADHD (dynamic ball games and Pilates) on reducing symptoms thereof

Resources index changes			Sum of squares	Degrees of freedom	Mean Square	F	Meaningfulness level	ETA
The effect of group	SNAP	Attention deficit	0.341	1 and 48	0.341	0.853	0.361	0.018
		Hyperactivity	2.433	1 and 48	2.433	6.507	0.014	0.122
		Compound	0.953	1 and 48	0.953	5.407	0.024	0.103
	CBCL	Attention problems	59.176	1 and 48	59.176	5.849	0.020	0.111
		ADHD problems	18.275	1 and 48	18.275	2.850	0.098	0.057

Based on the data presented in table (1), F-value with degrees of freedom (1 and 48) is significant in a $\alpha=0.05$ level regarding hyperactivity (P=0.014 and F=6.507) and the combined type (P=0.024 and F=5.407) in SNAP and attention problems (P=0.020 and F=5.849) of CBCL; it can therefore be concluded that there is a significant difference between the effects of consistent physical activity in students with ADHD symptoms (highly dynamic ball games) and inconsistent physical activity in students with signs of ADHD (Pilates). Regarding the symptoms of Attention Deficit / Hyperactivity attention deficit disorder the comparison of the means in the posttest stage shows that the reduction of the symptoms in the secondary type of hyperactivity (Pilates) and the combined type is more in physical activity inconsistent with disorder signs (Pilates) than in physical activities consistent with ADHD symptoms (energetic ball games). As for the category of attention problems , the reductions in scores in physical activities is consistent with the symptoms of the disorder (ADHD)- (highly dynamic ball games) which was found to be in a higher level than physical activities inconsistent with the symptoms of the disorder (Pilates). Also from the data tabulated in table (1), it was found that because F-value obtained a degrees of freedom of (1, 48), it was not significant in the secondary type of ADHD attention deficit and difficulties in α =0.05 level, therefore, it can be concluded that there is no meaningful difference between the impacts of physical activity consistent with the symptoms of attention deficit / hyperactivity (ADHD) - (highly dynamic ball games) - and physical activity inconsistent with the disorder symptoms- (Pilates) -, on the symptoms of Attention Deficit / Hyperactivity.

4. **Discussion and conclusion:**

The present study aims at the comparison between the effects of consistent versus inconsistent physical activities on decreasing the symptoms of attention deficit/hyperactivity disorder syndrome (ADHD). The results obtained from the study data and the relevant analyses are indicative of the existence of a significant difference between the effects of consistent and inconsistent physical activities in patients with ADHD (highly dynamic ball game and Pilates) over the secondary type of hyperactivity and the combined type of attention deficit/hyperactivity.

Based on the results, although both of the activity types are effective on improving the ADHD symptoms, the extent to which the symptoms are reduced in secondary type of hyperactivity and the combined type is higher in physical activity inconsistent with disorder symptoms (Pilates) than the physical activity consistent with the disorder symptoms(highly dynamic ball games).Furthermore with attention deficit, the reduction in scores obtained for the physical activity was consistent with disorder symptoms (highly dynamic ball game) and is higher than the physical activity which is inconsistent with the disorder symptoms (Pilates).

A study titled "the effectiveness of the ball-non ball games on decreasing the symptoms of attention deficit-hyperactivity" showed that both physical activity types are effective in improving the attention deficit/hyperactivity. The results reported from a study by Sa'adat (2012) indicated that the intervention types, Yoga and game therapy are effective in reducing the attention deficit/hyperactivity. Also, Jannatiyan et al (2009), and Shields et al (2010) showed that sport activities are effective on the intensity of the symptoms in patients with attention deficit/hyperactivity. Some of the other studies also evaluated the effect of the sport activities, group sports and aerobic, on improving and reducing attention deficit/hyperactivity symptoms and impulsivity as positive (Bakhshipur et al, 2013; Wiegal et al, 2006).Jensen and Kenny (2004) in a study surveyed the 8-13 years old boys with attention deficit/hyperactivity and reported that yoga exercises cause a greater improvement in response control in contrast to the group activities. Moreover, their studies demonstrated that there is a significant difference between the game therapies and aerobic in dynamic balance of the children with attention deficit/hyperactivity but no significant difference was found between the two groups in static balance. In other words, group game therapy exerts a greater influence on the improvement of the dynamic balance of the children with attention deficit/hyperactivity disorder, but aerobic was shown to have significant effectiveness in improving the static balance (Bakhshipur et al, 2014). In spite of the fact that both physical activities were found to be effective in the our study, the results confirm that the rate to which the symptoms are reduced in the secondary type of hyperactivity disorder and the combined type of the disorder is found higher in the physical activity inconsistent with the disorder signs (Pilates) than in physical activities consistent with the disorder signs (highly dynamic ball games). This can be attributed to the fact that in such children, brain efficiency was found to be faulty in a number of disorders such as hyperactivity.

Right hemisphere dysfunction and damages thereto, basal ganglia (due to the relationship between muscular movement control and voluntary movements) as well as frontal lobe and prefrontal brain bring about a reduction in the individual's voluntary movement activities which is affected by hyperactivity; becomes the most vivid problem these children may exhibit. According to the Aires (1989) emotional accretion is the theory of the relationship between brain and behavior. Dyvlyn and colleagues believe that emotional accretion provides the necessary ground for the right emotional perception and then appropriate motor responses to it. As a result, we can expect the intervention of emotional integration created due to decreasing impulsivity to be improved (Ebrahimi, et al., 2013).Based on the theory of brain trauma, the individuals with attention deficit/hyperactivity disorder syndrome are found to have deficiencies and dysfunctions in their right hemisphere. Emotional accretion is an intervention involving the entire system of the brain and body; in such a way that it, initially brings about a growth and improvement in the brain and body systems via concentrating on primitive vestibular and subtle nervous systems and then subsequently expanded to the higher levels of the nervous system and then paves the way for the superior functioning of the brain such as motor skills. This result in improvement which can be expected to be accomplishing through emotional accretion interventions impulsivity stemming from a reduction in motor activities (Ebrahimi et al, 2014).

Dyshman et al (2006) reported that physical activity can positively change the neuronal brain plasticity by means of neural production processes, neural adaptation and neural protection. Majorek and colleagues (2004) evaluated the effect of harmonic movements, as a type of motion therapy, on the behavioral performances of five children with attention deficit/hyperactivity disorder syndrome. They reported of positive effects of movement programs on attention span, concentration, rhythm of work and skills such as coordination, dexterity and social behavior. Powel et al (2008) studied the effect of Yoga-therapy on the behavioral symptoms of individuals with the disorder presented in this study and the results were reflective of the improvements acquired in behavioral signs. The results obtained in the study performed by Bushanz et al (2009) also confirm the effectiveness of yoga in improving the impulsivity in children with attention deficit/hyperactivity syndrome. The study by Beik et al (2015) also suggested the effectiveness of yoga in improving the executive functions (response inhibition, vigilance, impulse control and situation change) in such children. Evidence suggests that yoga exercises, especially respiration exercises (Pranayama) cause the dynamic cortex to be strengthened and this, in turn, improves retention and response control (Gore, et al., 1989).

Stress and pressure are among the factors that stimulate the brain stem and promote hyperactivity in children with ADHD. Pilates exercises can reduce symptoms of hyperactivity and increase response inhibition by reducing stress, pressure, and by relaxation of tension. Based on Berkeley model (2005), it can be stated that the primary defect in

this disorder is the impulse control. So if the ability to inhibit impulses in a person recovers, executive functions will improve (Brast-Groondi and Butler, 2004).According to the principle of relaxation, yoga (and similar Pilates exercises) reduces pressure and muscle tension thereby causeing muscle relaxation, reduces stress, and ultimately improves impulsivity (Syvasankaran, et al., 2006). In addition, it also increases alpha waves bands and theta in the occipital region of the brain (one of the centers of impulse control) and decreases heart beat and breathing, which in turn reduces the amount of impulsivity (Astnkak et al., 1991). Astnkak et al (1991) showed in a study that yoga exercises boost the alpha and theta waves bands in the occipital region of the brain, one of the centers of impulse control; consequently, with the increase in the waves' efficiency the impulsivity will be controlled by the brain to a greater extent. On the other hand, yoga exercises improve alpha waves and reduce the muscular tensions, heart beat and respiration which in turn reduce the impulsivity. Based on the studies performed, it seems that yoga exercises can improve the disorder aided by frontal lobe areas of the brain that is associated with the change of position (Kraft, 2010). Evidences show that yoga relaxation exercises cause the limbic system to be stimulated which resulting in improvement in the brain functioning (Raily, 2004). Also, on elucidating the results, it can be said that emotions such as stress, depression and lack of self-confidence are very common among these children. Stress causes a reduction in frontal lobe growth which result in the effective cognitive performance suffering. Also, when the body is under stress or fear, a person may be affected by hyperactivity under the influence of brainstem function (Fsyg, 2006). With its emphasis on harmony between body, mind and spirit, Pilates can influence the emotional regulation of the child, reduce stress, increase positive emotion, improve interpersonal relationships, and ultimately reduce the inappropriate behaviors in hyperactive children. In addition, physical activity is known as a strong stimulant for hypothalamic, mucous-adrenal, pituitary and noradrenergic systems (Best, 2010). Bryne et al state that active sport participation may be associated with the reduction in depression and anxiety symptoms in children with attention deficit/hyperactivity (Kilock et al, 2009). Also, sport exercises cause an increase in the rate at which the neurotransmitters are released and this is the reason why the dopamine accessibility is elevated in central nervous system.

Besides the improvements in the above-mentioned tensions, other effects such as self-control, concentration exercises and learning various methods of problem-solving, problem revision and finally responsibly controlling of one's behavior derived from Pilates exercise are the factors contributing to the effectiveness of such type of intervention. Also, taking part in physical activity sessions which make the participants spend a fraction of their energy in these sessions brings about the grounding for the reduction in participants' impulsivity and hyperactivity in the remaining hours of the day. Moreover, in justifying how a balance-based and concentration-based physical activity may influence the hyperactivity symptoms, it can be said that according to diagnostic signs of ADHD and its association with dysfunction in vestibular system as well as faulty balance information processing, it can be deducted that Pilates leads to the decline in the symptoms of hyperactivity and contributes to the recovery of these people via facilitating balance information processing through the provision of appropriate stimulation. In line with this, some of the researches have shown that though concentration instructional games are effective on reducing the intensity of symptoms of attention deficit/ hyperactivity syndrome in its combined form (Rezazadeh et al, 2008).

In explaining the results, it can be noted that the improvement in hyperactivity/impulsivity symptoms is largely associated with the child's experience. In their developmental period, the children obtain their experiences in many ways, especially through the games. So, if we can enrich the environment and make the necessary infrastructure for group games and actions, it will probably help to improve the hyperactivity-impulsivity and growth of children (Shushtari, et al., 2011).Despite the effectiveness observed for both of the physical activities, the results show that in terms of attention problems, declining grades in physical activity consistent with the symptoms (energetic ball games), are in a higher rate than with the case of physical activity inconsistent with symptoms (Pilates).One of the mechanisms that can be physiologically and neutrally be used as a justification to the improved cognitive function subsequent to physical exercise is increasing cerebral blood flow that leads to cognitive performance progresses (Korydo and Shale, 2007). Studies on animals indicated that taking part in physical activities causes an increase in cerebral blood circulation in areas of dynamic control, balance, cardio-pulmonary, as well as areas of the hippocampus (Perera, et al., 2007). Therefore, the increase in cerebral blood circulation as a result of performing physical exercises might provide the neural functions with a larger amount of fuel and destroy the redundant metabolic material existing in such areas and doing so, the cognitive performances are improved including attention. A study c by Sarli et al (2015) indicated that physical exercises could significantly reduce the visual and auditory attention deficits in children with attention deficit/hyperactivity disorder in comparison to the control group This is consistent with our findings. In justifying the results obtained it can be said that attention deficits, lack of dynamic skills and the other performances are caused when the preliminary brain development is disrupted. The high rate of attention deficit and dynamic coordination weaknesses co morbidities are indicative of the presence of common neurological mechanisms. It has been put forward that there are greater associations seen between the fine dynamic

skills and dynamic coordination with the attention deficits in children with attention deficit/hyperactivity disorder, the improvements made in these areas can be an effect on the reduction of the attention problems in experimental group (Sarli et al, 2015). In explaining this issue it can be said that attention deficit is the most distinct and the biggest problem these children have and it makes them have problems in controlling various stimuli and responding to only one of these stimuli and fall short of well performing such an action. Accretion of the deep and vestibule senses resulting from physical activities affect the high levels of brain functioning which are in charge of important processes as attention, and subsequently improve the composure of the children's sensual comprehensions of the environment and the stimulants, so that the spatial and temporal aspects of sensory inputs are processed, interpreted, and combined. Furthermore, the brain integrates the information, amplifies them, and takes them under control and compares and unites them in the form of a flexible and changing pattern. Hence, this enhances the process of the children's responding to just one stimulus as well as controlling other environmental stimulants and it is through correcting the attention deficit that some of the other inabilities in social behaviors can also be eliminated and, consequently, this will pave the way for the affected children's academic achievement, followed with positive and considerable outcomes in their daily lives.

Furthermore, it can be stated that when the body is under stress or pressure, the individual might be subjected to the effects of brain stem performance as a result of which hyperactivity may rise or s/he might be found with reductions in attention and concentration scopes (Fsyg, 2006). Through reflecting the child's emotions, game-playing makes him or her gain insights regarding his or her behavior. When the child's emotion is expressed, high dynamic ball games cause reductions in stress and aggression in the children thereby facilitating enough time for rest and recharge their concentration capacity. Quite similarly, playing games cause relaxation and improvement in attention problems. The results of the studies undertaken by Pankseb and colleagues (2003) on rats with frontal lobe damage (attention deficit-hyperactivity modeling in humans) showed that without playing, self-control and other administrative functions do not grow properly. In fact, physical play, too much playfulness, and impulsivity, reduced frontal lobe damage in the mice.

Of the other possible reasons behind the improvement in the problems of the patients with ADHD subsequent to taking part in highly dynamic ball games one can point to the encouragement to do team-work, being considered by the others and agreeability in group while participating in exercise sessions. Furthermore, the participants feel much better when they participate in team works and this feeling makes them exert much more attention and precision regarding various issues which will be generalized by them to other conditions and situations.

Finally, since the studies performed in this regard have been found which confirmed the negative psychological and social consequences of this disorder including the idea that the patients with ADHD are evaluated as not likable and negative by their parents, teachers and their normal counterparts of the same age as a result of their shortcomings and deficiencies in demonstrating social skills, they therefore feel ignored and repelled (Rapaport, 2009) which will lead them to have considerable problems in their academic, cognitive, social and emotional as well as occupational and familial performances (Stephan et al, 2009). And, these problems will intensively exert detrimental effects on their self-confidence and self-esteem. Moreover, based on the applied results obtained it is hoped that when these children are given the right opportunities and guidance to take part in sport activities consistent with the type of the disorder they have, in addition to the improvement in the disorder, they can also be provided with encouragement, approval and social agreeability. And also they will hopefully benefit from selecting and performing the method presented herein through raising parents' awareness and explaining the relative benefits of physical activity in contrast to the other therapeutic interventions.

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Loading, release, and solid phase extraction of sorafenib using smart nanoparticles

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Abstract

This study investigated the loading, release, and solid phase extraction of sorafenib by a smart nanoparticle (SNP). The SNP was prepared by grafting N-isopropylacrylamide and chitosan on the surface of iron oxide nanoparticles. The adequacy of the synthesis method was confirmed by Fourier Transform Infrared Spectroscopy (FTIR), X-ray powder diffraction (XRD), and transmission electron microscopy (TEM). An experimental design based on the full factorial model shows that the maximum drug loading is 222.585 µgmg^{-1}. The release profile of sorafenib in the simulated gastric and intestinal environments demonstrated that SNP can be used to design the formulation of a sustained drug release system. The SNP's ability was evaluated to extract and determine sorafenib in biological fluids using the solid phase extraction technique. A high recovery of the drug in human blood and urine samples showed that the method is appropriate.

Keywords

Sorafenib, smart nanoparticles, drug delivery, solid phase extraction

1. Introduction

Sorafenib is an oral kinase inhibitor with anti-angiogenesis and anti-tumour effects. It is used to treat cancers of the liver, kidney, lung, and thyroid[1-4]. Sorafenib is currently clinically available in oral and tablet formulations. The two formulations are administrated orally and waste a lot of drugs in the gastrointestinal tract and blood circulation until it reaches to the desired cells or tissue. The slightly absorptionof the drug in the gastrointestinal tract is compensated by increasing the dose which causes many side effects such as hand-foot skin reactions, hair loss, gastrointestinal bleeding, diarrhea, high blood pressure, fatigue, and lack of appetite[5, 6].

Designing new drug delivery systems based on nanotechnology could be a solution to these problems. The new drug delivery systems are nano-carriers that release the drug at a given time and with a controlled release dosage [7]. Nano-carriers have some benefits over free drugs.For example, they protect the drug from premature

degradation, prevent it from prematurely interacting with the biological environment,enhance absorption of the drug into a selected tissue (for example, solid tumour), control the pharmacokinetic and drug tissue distribution profile, and improve intracellular penetration[8].

To create nano-carriers, iron oxide nanoparticles and polymers—natural or synthetic—can be used [9]. Iron oxide nanoparticles have many applications in hyperthermia, drug delivery, magnetic separation, and MRI because of their biocompatibility, ease of surface modification, and super-paramagnetic properties [10].

In drug delivery applications, it is essential for iron oxide nanoparticles to have certain functional groups on their surface to facilitate loading and drug release. Therefore, the surface of these nanoparticles must be a functionalized polymer shell[11]. The polymers that are used must be biocompatible, biodegradable, and non-toxic[12]. Due to the mentioned properties, chitosan is an appropriate polymer with functional groups of $-NH_2$ and -OH for loading drugs[13, 14].Additionally, smart polymers like N-isopropylacrylamide can be used to regulate drug release due to a phase change rather than a temperature change[15, 16].Grafting of chitosan and N-isopropyl acrylamide to the surface of iron oxide nanoparticles leads to the synthesis of a smart nanoparticle material with excellent properties of three substances.

From medical and clinical viewpoints, the determination of drug concentrations in body fluids, such as urine and blood plasma, has increasingly been necessary to assess toxicity, side effects, drug interaction, and effectiveness of treatment[17]. Therefore, the development of sensitive and reliable methods of analysis to determine sorafenib is a basic requirement to study the drug in biological fluids. The solid phase extraction technique is appropriate due to its simplicity, low cost of extraction, and the determination of drug concentrations in biological fluids in a short time[18, 19].). Using the radical polymerization technique, nano-sorbents with high adsorption capacity and high selectivity can be produced[20]. These new nano-adsorbents can be used in the solid phase extraction process.

In this study, we prepared sorafenib-loadedSNP as asustained drug releasesystem.The SNP was also applied for sorafenib extraction inspiked biologicalfluids to determinethe sorafenib concentration by solid phase extraction technique and high performance liquid chromatography (HPLC).To synthesize SNP, the iron oxide nanoparticle (IONP) was first synthesized by the co-precipitation method.Then, the synthesized IONP was coated with a layer of SiO_2 using 3-(Trimethoxysilyl)-1-propanethiol silanization agent.Subsequently, the surface of the coated IONP was grafted with Allyl-2,3-epoxypropyl ether as the cross-linker, N-isopropylacrylamide as the thermo-sensitive monomer, and 2-azobisisobutyronitrile as the polymerization reaction initiator. Finally, chitosan was coupled with Allyl-2,3-epoxypropyl ether to interact with sorafenib via hydrogen bonding, and its sustained release in response to temperature was enabled using N-isopropylacrylamide as the thermo-sensitive agent.

2. Materials and methods

2.1. Instruments

The pH was measured using a HANNA model 211 pH meter (Weilheium, Germany).A JASCOV-530 UV-Vis spectrophotometer was employed to measure the drug.Chromatographic separations were carried out on an

Agilent HPLC, 1200 series, equipped with a UV/Vis detector. Infrared spectra wererecordedon a Perkin-Elmer Fourier transform infrared spectrometer (FTIR version 10.03.07, USA).A D8, Advance, Bruker, AXS X-ray diffractometer was used for X-ray analysis. Phase identification was performed by matching peak positions and relative intensities to reference JCPDS files. TEM was carried out using a Philips EM30.

2.2. Reagents and solutions

Allyl-2,3-epoxypropyl ether, 3-(Trimethoxysilyl)-1-propanethiol, n-octanol, ammonia solution, toluene dried, solvents, acetic acid, and other inorganic acids (99.9% purity) were provided by Merck (Germany). 2-azobisisobutyronitrile, chitosan, and N-isopropylacrylamide were bought from Sigma-Aldrich. Sorafenib was bought from Hangzhou, China. The stock solution ($500\mu gmL^{-1}$) of sorafenib was prepared in methanol. To adjust the pH of the solutions, either an acetate buffer or a phosphate buffer was used wherever suitable.

2.3. Synthesis of SNP

2.3.1. Preparation and coating of IONP

The IONP was prepared following a previous study[21].To explain briefly, 6.8mmol $FeCl_2 \cdot 4H_2O$ and 13.6mmol $FeCl_3 \cdot 6H_2O$ (molar ratio 1:2) were dissolved in 100mL de-ionized water in a three-necked flask fitted with a reflux condenser and a magnetic stirrer. The solution was heated to $80^{\circ}C$ and then 100mL NH_4OH (0.1 M) was added in drops in an N_2 atmosphere. The reaction was maintained at $80^{\circ}C$ for two hours. Then,3g of the prepared IONP was dispersed in 50mL anhydrous toluene containing 3-(Trimethoxysilyl)-1-propanethiol (5% v/v) and refluxed at 65°C for 72 hours with mechanical stirring. The resulting product, namely TSP-IONP, was separated magnetically. It was subsequently washed with anhydrous toluene to remove excess TSP, and then dried in vacuum at room temperature.

2.3.2. Polymer grafting and coupling

Two grams of NIPAM, 20mL of Allyl-2,3-epoxypropyl ether, and 3g of TSP-IONP were dispersed in 30mL ethanol in a three-necked flask fitted with a reflux condenser and a magnetic stirrer. Then, 0.1g of 2-azobisisobutyronitrile was added into the flask and heated to 65°C in an N_2 atmosphere for seven hours. The product, namely, grafted-IONP, was rapidly added in 50mL acetate buffer (pH 5) containing 1g of chitosan and 0.1g of NaCl and stirred with a mechanical stirrer. The chitosan was coupled with the grafted-IONP via an epoxy ring-opening reaction with Allyl-2,3-epoxypropyl ether at 40°C for 48 hours. The final product (SNP) was separated by a magnet after cooling it to room temperature. Subsequently, it was washed with an acetate buffer and de-ionized water to remove excess reactants, and dried in a vacuum desiccator. The SNP was characterized by FTIR, XRD, and TEM.

2.4. Drug loading

According to Tables 1 and 2, an experiment was designed using Minitab17 software based on a full factorial model for three variables, including the concentration, temperature, and pH of each at three levels. The design of experiments showed that their number was 54, considering two repeats and random. To conduct the experiments, 1mg of the SNP was added to 54 flasks. Then, 5mL of the drug solution was added to each of them

in accordance with Table 2, and placed in the shaking incubator. After an hour, the liquid phase was separated magnetically and the final concentration of the drug was determined by the Uv-Vis. spectrophotometer. The drug loading (DL) by the SNP (μgmg^{-1}) was obtained with the following equation[22]:

$$DL = (C_i - C_f)\frac{V}{M} \qquad (1)$$

Where C_i (μgml^{-1}) and C_f (μgml^{-1}) are the initial and final drug concentrations in the liquid phase, V (mL) is the volume of the liquid phase, and M (mg) is the mass of the used SNP.

Table1: Definition of the level factors for the study.

Number of level	Concentration (μg mL^{-1})	Temperature (^{o}C)	pH
1	400	25	7
2	200	35	5
3	10	45	3.5

Table2: General full factorial design of experiments for drug loading (Definition of level factors are presented in table 1).

Std Order	Run Order	C(μg mL^{-1})	T (^{o}C)	pH	DL (μg mg^{-1})
39	1	200	25	7.0	198.60
50	2	400	35	5.0	52.17
24	3	400	35	7.0	144.16
48	4	400	25	7.0	223.80
12	5	200	25	7.0	196.68
30	6	10	25	7.0	25.76
40	7	200	35	3.5	24.31
32	8	10	35	5.0	6.09
21	9	400	25	7.0	221.37
1	10	10	25	3.5	5.54
16	11	200	45	3.5	7.32
36	12	10	45	7.0	5.00
14	13	200	35	5.0	46.27
49	14	400	35	3.5	27.40
11	15	200	25	5.0	69.52
29	16	10	25	5.0	9.32
37	17	200	25	3.5	37.74
23	18	400	35	5.0	49.04
25	19	400	45	3.5	7.75
3	20	10	25	7.0	27.40
7	21	10	45	3.5	1.01
19	22	400	25	3.5	42.53
15	23	200	35	7.0	126.32
2	24	10	25	5.0	9.91
4	25	10	35	3.5	3.53
38	26	200	25	5.0	71.83
34	27	10	45	3.5	0.95
41	28	200	35	5.0	43.49
17	29	200	45	5.0	12.31
47	30	400	25	5.0	81.00
33	31	10	35	7.0	16.59
31	32	10	35	3.5	3.20
53	33	400	45	5.0	14.78
44	34	200	45	5.0	13.10
9	35	10	45	7.0	4.70
54	36	400	45	7.0	38.39
8	37	10	45	5.0	1.69
10	38	200	25	3.5	40.15
27	39	400	45	7.0	40.84
28	40	10	25	3.5	5.21
51	41	400	35	7.0	143.51
18	42	200	45	7.0	34.07
6	43	10	35	7.0	17.65
5	44	10	35	5.0	6.48
42	45	200	35	7.0	128.00
45	46	200	45	7.0	36.24
43	47	200	45	3.5	6.80
13	48	200	35	3.5	25.86
52	49	400	45	3.5	8.25
20	50	400	25	5.0	79.14
46	51	400	25	3.5	42.25
35	52	10	45	5.0	1.80
26	53	400	45	5.0	13.89

22	54	400	35	3.5	29.15
Response Optimization					
		400	25	7	222.588

2.5. Drug release

To evaluate the performance of the SNP in sorafenib release, the dialysis method was used. The sorafenib-loaded SNP was placed into a dialysis bag and immersed for two hours in a 200ml beaker with 100ml of simulated gastric environment (HCl: 0.1 N; pH=1.2) containing 1% (v/v) Tween 80 (HClT).This beaker was placed in a shaking incubator with a stirring speed of 30 rpm at a temperature of 37°C. Next, at 5, 10, 15, 20, 25, 30, 60, and 120 minutes, 2mL of HClT was withdrawn, and the released sorafenib was determined by the Uv-Vis. spectrophotometer. The withdrawn HC1T was replaced with the same volume of fresh HClT. The test was performed in three different batches.After two hours, to simulate the intestinal environment, the dialysis bag was immersed inside a 100mL phosphate buffered saline (PBS; pH=7.4) containing 1% (v/v) Tween 80 (PBST) and put in a shaking incubator at 37°C. At 3, 5, 8, 12, 24, 30, and 35 hours, the concentration of sorafenib in the samples was measured as described below. The drug release was calculated from the following equation:

$$\text{Drug release}\% = \left(\frac{\text{Amount of drug released at time t}}{\text{Amount of drug-loaded SNP}}\right) \times 100 \quad (2)$$

2.6. Solid phase extraction

The SNP performance for the extraction and determination of sorafenib in the spiked human blood and urine samples without any pre-treatment was analysed by the solid phase extraction technique in optimum conditions [23].). Human blood was separately controlled and found to be negative for HBS antigen and HIV I, II, and hepatitis C antibodies.Prior to analysis, for the separation of red blood cells, the blood samples were centrifuged at 10,000 rpm for five minutes, and the supernatant was kept at −20°C. For extraction, a set of solutions (1 mL) containing 1 µg mL^{-1} of sorafenib were made, transferred into micro-tubes, and the pH levels were adjusted to the optimum value of 7 using a buffer solution. Next, 1mg SNP was added to each solution, and the mixture was vortexed for 10 minutes. The liquid phase was separated magnetically, and 1mL methanol was added to the remaining SNP as an extraction solvent. The concentration of sorafenib in the solvent was determined by HPLC. Separations were carried out on a Zorbax Extend C18 column (15 cm×4.6 mm, with 3 mm particle size) from Agilent Company (Wilmington, DE, USA). The mixture of acetonitrile and phosphate buffer (45:55, v/v), at a flow rate of 1mL min^{-1}, was used as a mobile phase in isocratic elution mode. The injection volume was 20µL for all the samples and the detection was performed at a wavelength of 265nm. The extraction recovery was defined as a percentage of the total sorafenib, which was extracted into the solid phase, and subsequently, into a solvent. This test was repeated for urine. The linearity, precision, accuracy, reproducibility, limit of detection (LOD), and limit of quantification (LOQ) of the method were also tested.

3. Results and discussion

3.1. Characterization

To ensure the synthesis of SNP and the presence of functional groups, infrared spectroscopy was used. According to Fig. 1, the 3423cm^{-1} and 591cm^{-1} peaks were respectively related to -OH and Fe-O groups in the iron oxide nanoparticles. The 1634 cm^{-1} and 1401 cm^{-1} peaks were respectively related to the H-O-H and CH$_2$ groups, which were trapped on the surface of the iron oxide nanoparticles by adsorbed water and solvent. The 1061 cm^{-1} and 2938 cm^{-1} peaks were related respectively to the Si-O bond and asymmetric and symmetric stretching vibration of C-H caused by iron oxide nanoparticles coated by 3-(Trimethoxysilyl)-1-propanethiol. Also, 1161 cm^{-1} and 1385 cm^{-1} were related respectively to the isopropyl group in N-isopropyl acrylamide and the epoxy functional group in Allyl-2,3-epoxypropyl ether. This shows that the polymer grafting was done correctly. The 1575 cm^{-1} and 1240 cm^{-1} peaks were related to an amino group in chitosan, and a C-N bond was formed between the amino group of chitosan and the epoxy group in Allyl-2,3-epoxypropyl ether. This shows that chitosan was successfully coupled. These results confirmed that the SNP synthesis was conducted correctly.
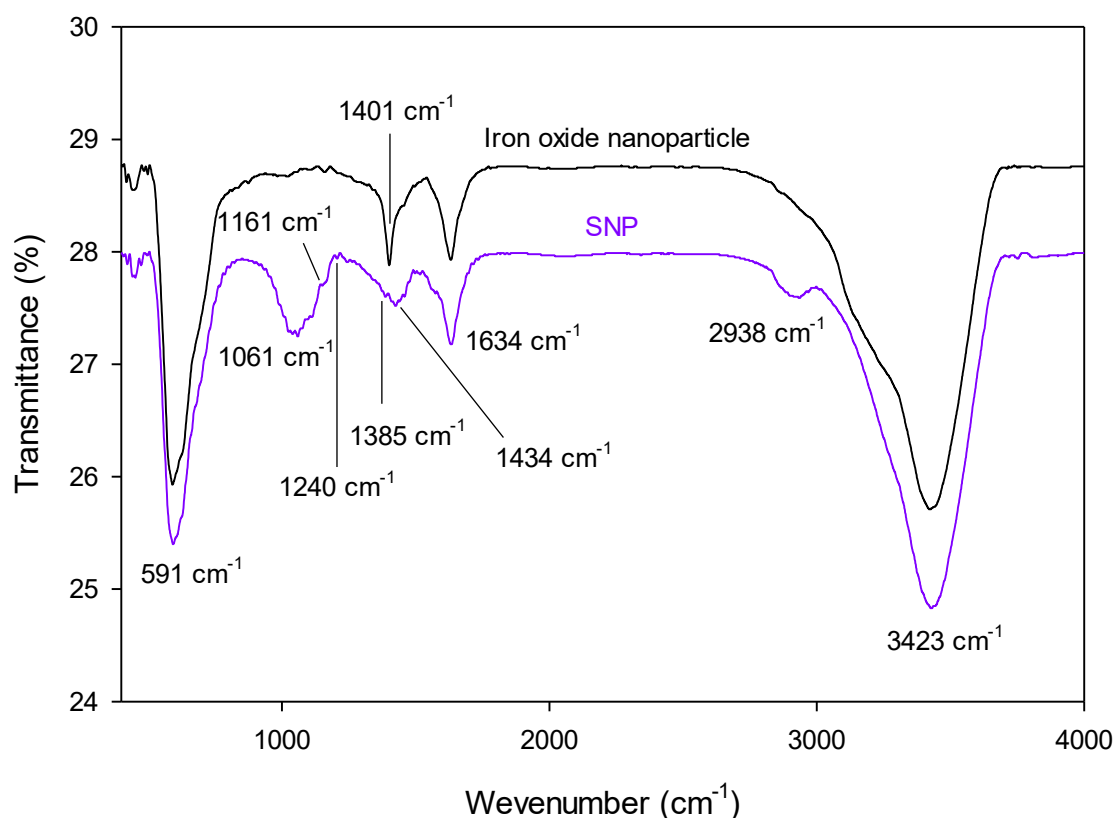
Figure1: FT-IR pattern of iron oxide nanoparticles and SNP.

The XRD analysis was used to detect the crystalline structure of SNP and the types of phases in it. According to Fig.2, in the XRD pattern of iron oxide nanoparticles, the peaks of 220, 311, 400, 422, 511, 440, and 553 were the characterization of the cubic spinel structure of magnetite crystals. The peak intensity of SNP decreased and flattened compared with the iron oxide nanoparticles. But no variation was created in the type of crystalline phase. The new peak (110) in the XRD pattern of SNP reveals amorphous silica particles, which are the reasons

for the binding of the silicate coating to the surface of the iron oxide nanoparticles. Using the Scherrer equation [24], the average crystal sizes of SNP and iron oxide nanoparticles were calculated as 18.88 and 24.64 nm respectively. A moderate size reduction of the crystal in SNP was due to the increase in the molecular volume caused by the processes of coating, polymer grafting, and coupling on the surface of the iron oxide nanoparticles.
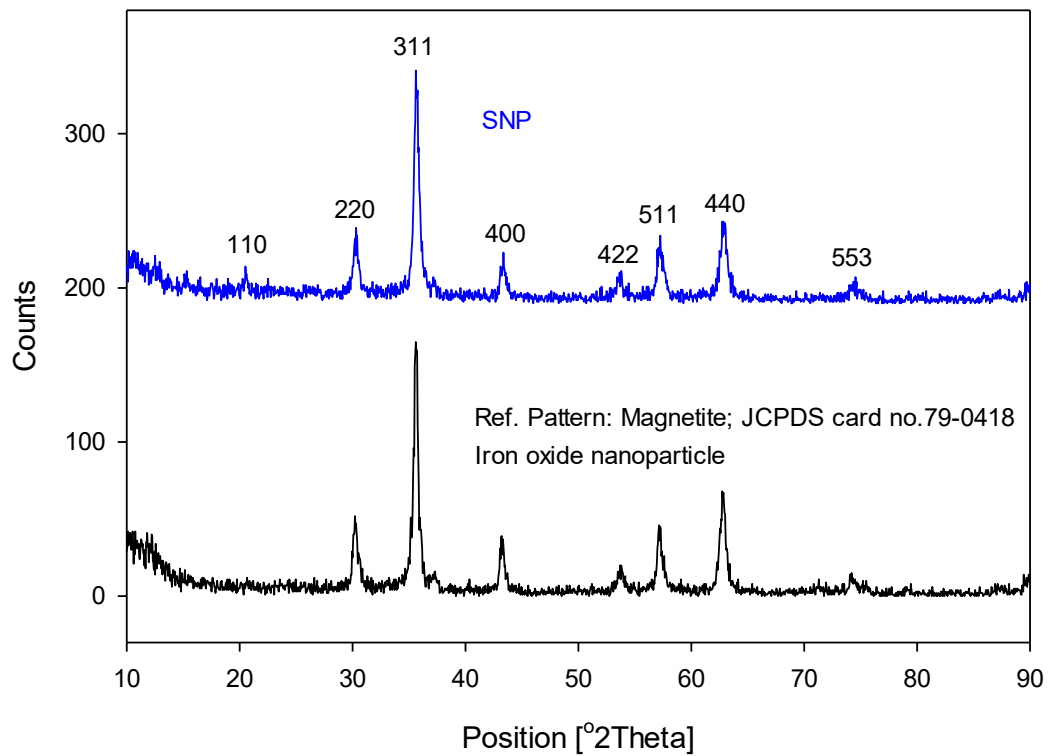
Figure2: XRD pattern of iron oxide nanoparticles and SNP.

The SNP size and morphology were studied using a TEM image. As it can be observed in Fig.3, SNP has a relatively spherical shape with a diameter of 20nm and some of them have formed as agglomerates.
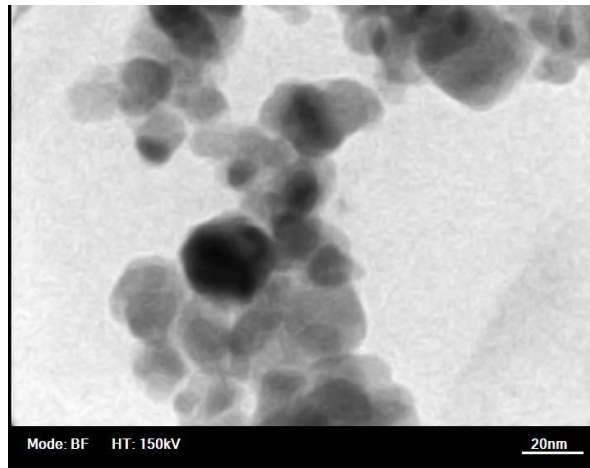
Figure3: TEM image of SNP.

3.2. Drug loading study

A full factorial design was carried out by considering the maximum number of experiments and the minimum error for the highest loading of sorafenib in accordance with Table2. To analyse the process of DL, data obtained from the tests should have a normal distribution. For this purpose, the graph of the normal distribution was used (Fig.4). As it can be observed, data obtained from DL is close to the straight line, and it represents the normal distribution of data. Therefore, the data of Table2 can be used to interpret and analyse DL.
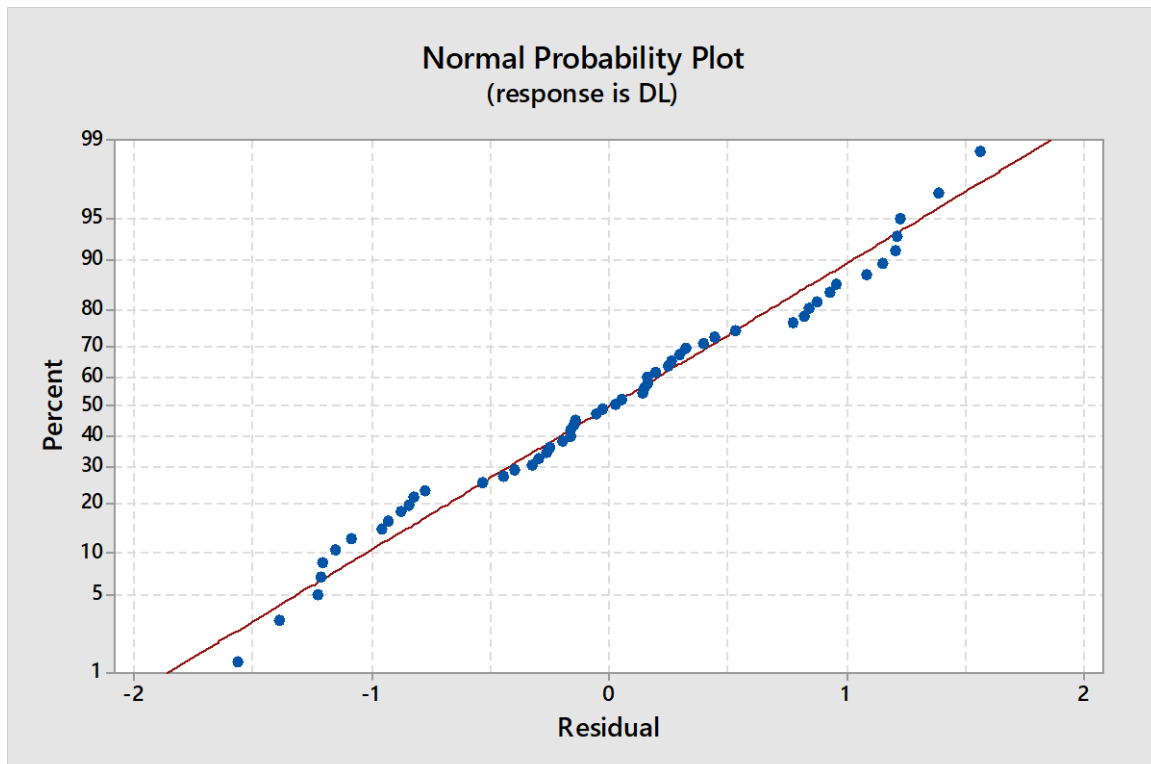
Figure4: Normal probability for drug loading data.

The analysis of variance obtained from the experimental design is shown in Table 3. In the variance test, the results are expressed in percentage—95%. Therefore, if P<0.05, it can be concluded with 95% confidence that it is an effective parameter. It should be noted that parameters with equal or close P-values are not effective to the response with an equal ratio. However, the parameter with greater F-values is more effective. Due to this probability for tests results, it can be concluded that all factors have been effective on DL. But the effectiveness of these factors on DL differs. The results demonstrate that the pH parameter is more effective than the rest.

Table3: Analysis of Variance.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Model	26	182823	7031.7	5600.97	0.000
Linear	6	130005	21667.4	17258.88	0.000
C	2	40393	20196.7	16087.41	0.000
T	2	36236	18117.8	14431.47	0.000
pH	2	53376	26687.8	21257.75	0.000
2-Way Interactions	12	41172	3928.5	3129.16	0.000
C*T	4	121370	3092.4	2463.20	0.000
C*pH	4	18319	4579.8	3647.98	0.000
T*pH	4	16453	4113.2	3276.30	0.000
3-Way Interactions	8	5677	709.6	565.25	0.000
C*T*pH	8	5677	709.6	565.25	0.000
Error	27	34	1.3		
Total	53	182857			
Model Summary					
	S	R-sq	R-sq(adj)	R-sq(pred)	
	1.12046	99.96%	99.93%	99.88%	

To study the effect of each factor on the amount of DL, the main effects diagram (Fig. 5) was used. As it can be seen, DL decreases with an increase in temperature from 25ºC to 45ºC. This is because of the presence of the smart polymer (N-isopropyl acrylamide) on the surface of the iron oxide nanoparticles. The SNP polymer chains include N-isopropylacrylamide, which expands at temperatures below LCST (32ºC) [25],and higher numbers of the functional groups of chitosan are available. This causes better loading of the drug. At temperatures above the LCST, DL on chitosan is suddenly reduced, which is related to the shrinking of the polymer chains by N-isopropyl acrylamide. Thus, chitosan's access to the drug is reduced.

The effect of pH can be justified according to the chemical structure of the drug and SNP. Chitosan in the SNP is protonated with amino ($-NH_2$) and hydroxyl (-OH) groups in the acidic environment[26]. According to the ChemAxon data sheet, sorafenib is not ionized in the pH range of 4 to 10. Accordingly, by increasing the pH from 3.5 to 7, a stronger hydrogen bond is formed between the sorafenib and chitosan so that the maximum loading occurs at pH 7. Since iron oxide nanoparticles dissolve in alkaline pH, a pH greater than 7 was not tested. Also, by increasing the concentration of the drug from 10 $\mu gmL^{-1}$to 400 μgmL^{-1}, the number of surface-active groups capable of establishing hydrogen bonds between the drug and the SNP increases. This will lead to more drugs being loaded.
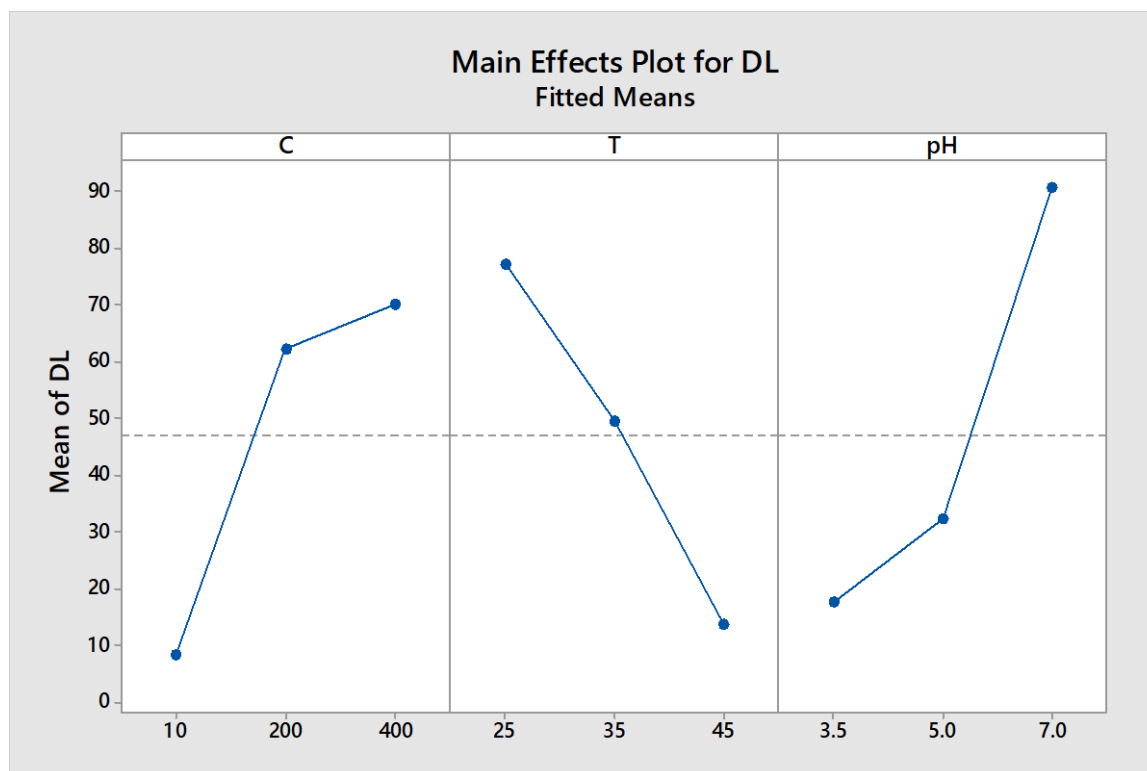
Figure5: Main effects plot for drug loading.

The results of the main effects diagram demonstrated that with an increase in concentration and pH, and a decrease in temperature, the amount of DL increases. Therefore, for maximum DL, concentration should be set at 400 μgmL^{-1}, temperature at 25ºC, and pH at 7.

To study the interaction of factors on the amount of DL, the interaction plot was used. As Fig.6 shows, when the amount of drug is low (10 μgmL^{-1}), DL increases slightly with decreasing temperature. But by increasing the concentration to 200 μgmL^{-1} and 400 μgmL^{-1}, the loading rate increases too much with decreasing temperature. In such a case, it is stated that the two parameters of concentration and temperature interact. If the changes in the response process in a concentration of 10μgmL^{-1} are similar to that in the concentrations of 200 μgmL^{-1} and 400 μgmL^{-1}, there is no longer a binary interaction between these two factors. In other words, when the slope of the drawn line is different, it can be concluded that the double effect is effective. It should be noted that the effectiveness of the binary effect was obtained through the variance analysis and its cause was explained in the main figure. Fig.6 only confirms it. With an increase in the concentration and pH of the drug solution, as well as with decreasing temperature and increasing pH, DL increases in large amounts. Since the slopes of the DL lines in these two states are different, the two parameters of concentration and pH, and temperature and pH interact.
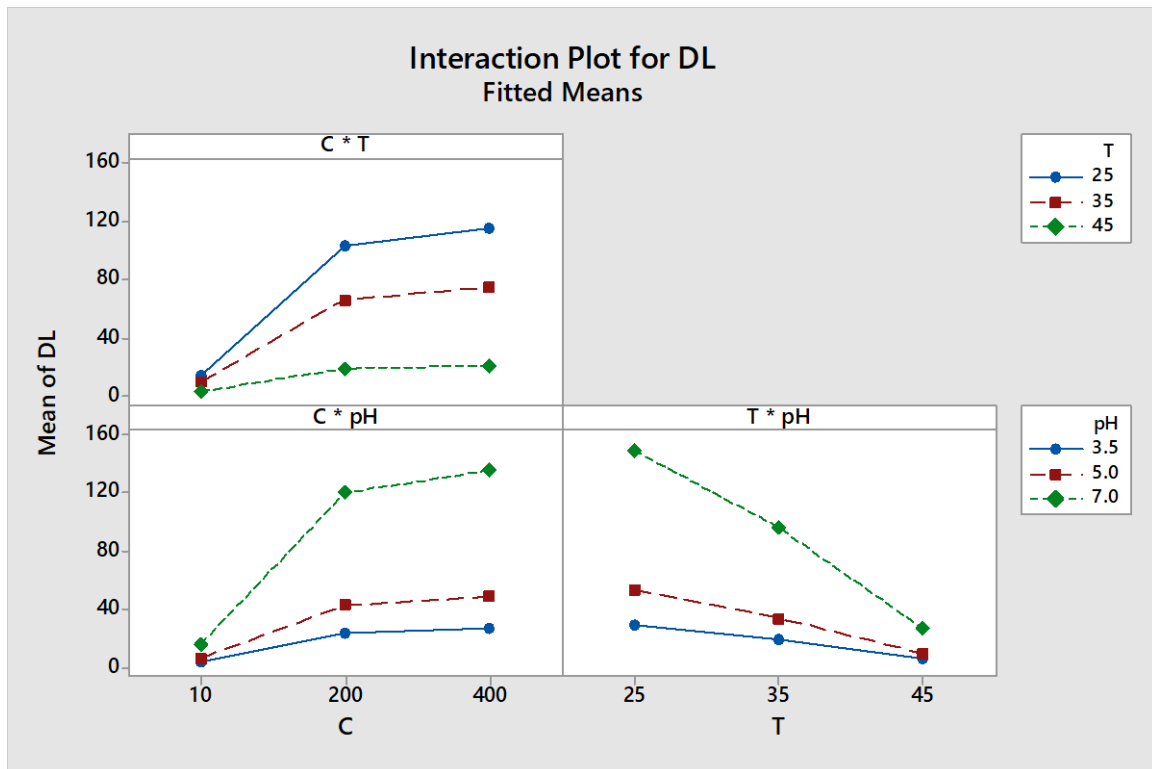
Figure6: Interaction plot for drug loading.

Finally, the best DL conditions are shown using the software in the optimization plot (Fig. 7), and the results are summarized in Table2.
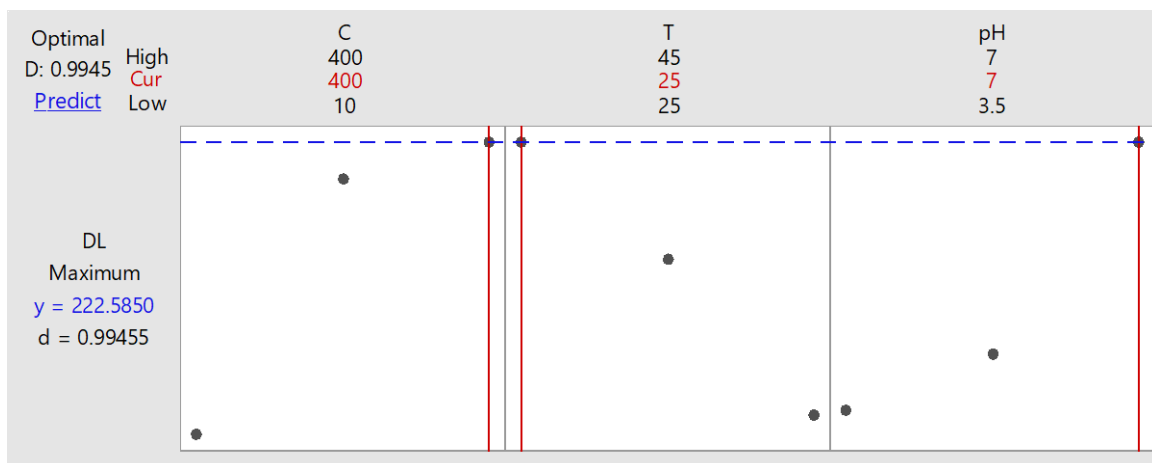
Figure7: Optimization plot of maximum drug loading conditions.

3.3. Drug release study

Sorafenib release from the SNP was evaluated in simulated gastric fluid (pH 1.2) and simulated intestinal fluid (pH 7.4) at body temperature (37ºC). As Fig.8 shows, in the simulated gastric environment in the primary 30 minutes, the drug is released from the SNP quickly (19.23%) and increases to 39.13% within two hours. Immediately after that, the drug release was studied in a simulated intestinal environment and a slow drug release pattern was observed until 35 hours. In both release environments, around 96% of the loaded drug was released within 35 hours. So, this property can be used as a sustained drug release system for oral administration. The release medium temperature (37°C) led to the shrinkage of the grafted polymer containing N-isopropylacrylamide on SNP with a corresponding enhancement of sorafenib release.
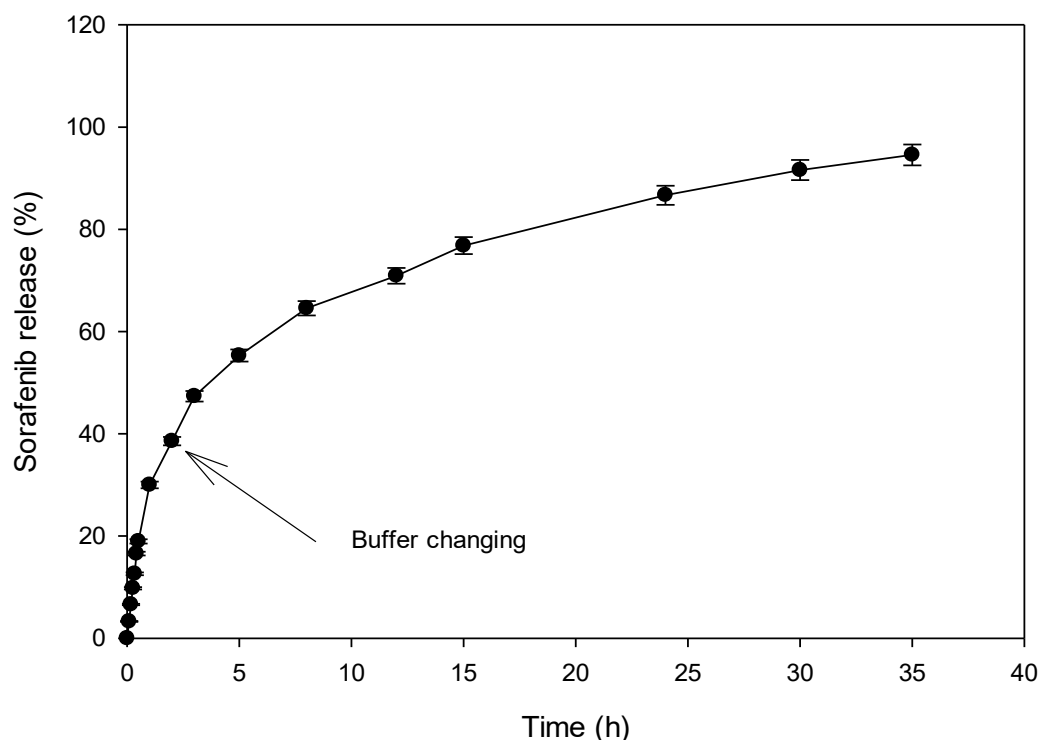
Figure 8: Sorafenib release in simulated gastric and intestinal environments

4.4. Solid phase extraction study

Human blood and urine samples were spiked with sorafenib before being subjected to the proposed method. The results in Table 4 show high recovery from human blood and urine, illustrating the suitability of SNP for sorafenib extraction and confirming the validity of the procedure.

Table4: Determination of sorafenib in different samples.

Sample	Concentration of sorafenib (µg mL$^-$^{1})	Added (µg mL$^-$^{1})	Found[a] (µg mL$^-$^{1})	Recovery (%)	RSD (%)
Blood	-	1	0.948±0.084	94.8	93
Urin	-	1	0.972±0.077	97.2	99

a For there determinations.

Validation parameters of this method, including linearity, repeatability, LOD, and LOQ, were calculated according to the data on three consecutive days. LOD is the amount of evaluated drug which is measured by device. Data values less than this concentration cannot be trusted. LOQ is the amount of evaluated drug that can be measured with optimized accuracy of device. The calibration curve of sorafenib (y=30.267C+0.008) with R^2=0.999 and RSD=2.28 (%) in the concentration range of 0.1-50 μgmL^{-1} is linear and also has good reproducibility and sensitivity. According to the method, LOD and LOQ of the method are respectively equal to 10.64 $ngmL^{-1}$ and 37.53 $ngmL^{-1}$. These results indicate that the method performed well analytically for SNP.

5. Conclusion

An experiment for DL was designed using the Minitab 17 software based on the full factorial model with three variables—temperature, pH, and concentration of drug. The maximum DL was obtained in a solution with a concentration of 400 μgmL^{-1} at 25ºC and pH 7. After the optimization of the loading conditions, a study of the sorafenib release in the simulated human body environment revealed that SNP can be used as a suitable carrier for sustained-release drug delivery consumptions. A big advantage of SNP is an increase in the drug-loading capacity and controlled release. This capability was considerable in this method compared with the previous techniques.The SNP solid phase extraction was successfully applied to the analysis of sorafenib in the biological samples.

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Investigating the impression of diet training on patients under hemodialysis

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Abstract

The results of Paired t-test showed that there were not significant statistical difference in treatment group before and after training. The results of independent t-test indicated no significant statistical difference of potassium factor before and after training in both groups.

Background: Nutritional care in patients with kidney failure is very essential. Due to gradual changes in patient's condition, nutrition care specialists must pay attention to their needs and status changes.

Objective: The main objective of this research is to identify the impact of diet programming on weight change and laboratorial factors between two sessions of dialysis in Khatami-al-anbia hospital, Zahedan, Iran.

Method: Two months before training, the levels of laboratory indices (potassium, phosphorus, calcium) and weight gain during two-month interval between two sessions of dialysis were extracted from the patients file and inserted in the questionnaire by the researcher. Then the training schedule which includes four -half an hour- speech sessions with educational notes was initiated. Then the effect of training, before and after it, on each item by comparison of the two-month average of variables and also by comparison of difference average of all variables were measured in treatment group rather than control group. Significant difference and average between before and after training and also difference average between treatment group and control group indicate the impact of training.

Result: T-test indicated that statistically there was no significant difference between the mean age of treatment group and control group (p=0/18, T=0/66)

Fisher test showed that treatment and control groups were homogeneous in terms of formal training status (p=0/33). Regarding t-test outputs in treatment group, there were statistical significant difference between two-month average weight gain before and after the training (p=0/001). The statistical results showed that there were significant statistical difference between two-month average weight gain at the beginning and during training in control group (p=0/03).

Discussion and Conclusion: Diet training is effective on the potassium serum levels of patients undergoing HD.

Keywords: Training, Diet, Hemodialysis

Introduction

Introduction: Chronic kidney disease (CKD) is classified in stages 1 to 5 by the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative depending on the level of renal function by glomerular filtration rate and, more recently, using further categorization depending on the level of glomerular filtration rate and albuminuria by the Kidney Disease Improving Global Outcomes initiative. Registered dietitian nutritionists can be reimbursed for medical nutrition therapy in chronic kidney disease stages 3 to 4 for specific clients under Center for Medicare and Medicaid Services coverage (1). In addition, nutritional care should depend on the type of treatment and their capacity including medicinal cure, hemodialysis and peritoneum dialysis and also kidney transplant (2). The main pillars of health protection are proper diet, fluid restriction and drug used in patients undergoing hemodialysis (HD). Diet observation, fluid restrictions and drugs used are important contributors to life expectancy and treatment problems (3).

CKD was introduced in 2002 as a set of clinical practice guidelines (CPG) that defined the term, stratified it into stages on the basis of severity, described its clinical course, and complications. The result has been a paradigm shift which not only transformed nephrology as a discipline but also affected the practice of medicine in general. A

practical list of the most common risk factors to target for CKD testing includes diabetes, hypertension, family history of kidney failure and age 60 years and older. The eGFR and urinary albumin–creatinine ratio (ACR) guide detection, assess prognosis, and determine management. Most of the care for CKD patients are delivered by primary care clinicians since CKD is common, with a prevalence of approximately 10% among the population of the industrialized countries (4).The BUN/Cr ratio is associated with worsening kidney function and adds incremental risk prediction information relative to traditional predictive measures in outpatients with heart failure at risk for worsening kidney disease. Since kidneys have high store capacity, the patients normally don't become aware of their illness until problems develops (5).CKD may develop gradually over several years or as a result of an ARF attack in which it is difficult for patient to get better.80% up to 90% of kidney tissues are destroyed in this disease (6). In such a condition, body's capacity to maintain the water-electrolyte balance destructs and finally leads to fatal uremia (a lot of urine and other nitrogenous substances retention in blood. All patients with ESRD (uremia) will need dialysis or kidney transplant to stay alive (7).

Uremia is a clinical and laboratory condition which cause damage and failure of about 90% of nephrons. In this process of CKD, many results such as hyperkalemia, pericarditis, high blood pressure, the volume of fluid, congestive heart failure, anemia and bone diseases , metastatic calcification as a consequence of phosphorus retention, hypokalemia, abnormal metabolism of vitamin D and Increased levels of aluminum threatens person's life(8).Concerning body potassium renal excretion, increase of potassium factor in CKD patients is one of the most common and the most dangerous Electrolyte abnormalities which can cause threatening arrhythmia(9). Impairment of kidney function is frequently observed in chronic heart failure (CHF). It correlates with clinical and neurohormonal status, and affects its prognosis (10).Although various conditions can cause CKD based on importance the following has been described: glomerulonephritis (24%), diabetes(15%), uncontrolled hypertension (9%), hereditary polycystic renal disease (9%), nephrosclerosis (8%), Interstitial nephritis(7%), pyelonephritis(3%), glomerulosclerosis (2%), as well as nephrotoxic drugs and heavy metals such as lead, cadmium, mercury and chromium(11).

In CKD, all body organs are affected by increased blood in urine, and manifestation of numerous signs and symptoms, which are dependent on the level of kidney disorder, background conditions and age (12). Clinical symptoms of advanced CKD are systemic due to the involvement of all body systems, which cause in cardiovascular system diseases as high blood pressure and changes in cardiac output, pericarditis and arrhythmia, in digestive system as anorexia, nausea, vomiting, gastrointestinal complications such as gastritis, peptic ulcer, diverticulum, colon blockage and then gastrointestinal(Gl) bleeding and at last but not least in musculo skeletal system as muscle cramps, osteodystrophy, bone pain and pathologic fracture.

The main objective of this research is to identify the impact of diet programming on weight change and laboratorial factors between two sessions of dialysis.

Material method

Two months before training, the amounts of laboratory factors (potassium, phosphorus, calcium) and weight gain during two-month interval between two sessions of dialysis were extracted from the patients file and inserted in the questionnaire by the researcher. Then the training schedule which includes four -half an hour- speech sessions with educational notes was initiated.   After doing so, the amount of laboratory factors (potassium, phosphorus, calcium) and weight gain interval between two sessions of dialysis were extracted from the patients file and inserted in the questionnaire. Then the effect of training, before and after it, on each item by comparison of the two-month average of variables and also by comparison of difference average of all variables were measured in treatment group rather than the control group. Significant statistical difference average between before and after training and also difference average between treatment group and control group indicate the impact of training.

Data

 T-test indicated that statistically there was no significant difference between the mean age of treatment group and control group (p=0/18, T=0/66).Fisher test showed that object and control group were homogeneous in terms of formal training status (p=0/33). Regarding t-test outputs, in treatment group, there were statistically significant difference between two-month average weight gain before and after the program (p=0/001). The statistical results showed that there were significant statistical difference between two-month average weight gain at the beginning and during the program in control group (p=0/03).

Table1. Absolutely and relative frequency distribution of patients under HD treatment age either in both treatment and control groups in khatam-al-anbia, Zahedan

Group age	Treatment		control	
	number	Percent	number	percent
<35	6	24	5	25
35-45	8	32	2	10
>45	11	44	13	65
total	25	100	20	100
mean	46/48		48/7	
Standard deviation	16/25		18/02	

Table2.Absolute and relative frequency distribution of official training of patients under hemodialysis treatment in Khatam-al-anbia hospital, Zahedan.

Group Previous diet training				
	number	percent	number	percent
Yes	9	36	4	20
No	16	64	16	80
total	25	100	20	100

Table3.Absolute and relative frequency distribution of two-month weight gain average interval between before and after training in patients under HD treatment within treatment group and control groupin Khatam-al-anbia hospital, Zahedan.

Group Period average Three-month weight gain (kg)	Treatment				control			
	Before training		After training		At the First of study		During study	
	number	percent	number	percent	number	percent	number	percent
0-1	1	4	2	8	1	5	2	10
1/1-2	8	32	13	52	10	50	13	65
>2	16	64	10	40	9	45	5	25
total	25	100	25	100	20	100	20	100
mean	1/89		1/64		2/29		2/92	
Standard deviation	0/63		0/5		0/72		0/66	
test	0/002				0/037			

Table4.Comparison of statistical tests and laboratorial factors and weight gain interval between two dialysis session in treatments and controls.

Laboratorial factor and weight gain / Statistical factor group	potassium		Phosphorus		calcium		Weight gain	
	mean	SD	mean	SD	mean	SD	mean	SD
treatment before training	5.12	0.46	5.35	0.89	8.62	1.05	1.93	0.66
Control before arrival	5.16	0.47	5.12	1.1	9.2	0.55	1/64	0.5
Treatment after training	5.47	0.6	4.57	0.6	8.3	1.12	2.29	0.7
Control after arrival	5.62	0.9	4.72	0.68	8.69	0.9	1.89	0.63

Discussion

Diet training is effective on amount of serum potassium of patients undergoing HD patients.as the results of paired showed, there was no significant statistical difference between treatment group before and after training. The results of independent t-test showed no significant statistical difference of potassium before and after training between both groups. Diet training didn't have effect on amount of potassium factor in serums of patients' under-dialysis treatment. Mulsanne results demonstrated that nursing interventions with diet training and therapy and didn't effect on serum potassium factor (14.15).However in Sarafi study about the effect of self-care training on knowledge, attitude and physical problems reduction in case of HD under-treatment patients, physical problems were effective on serum potassium factor 16).

Diet training has an impact on phosphorus amount of patients under HD treatment. Paired t test (P=0/99) showed that there wasn't a significant statistical difference in phosphorus average of treatment group before and after training. Independent t-test demonstrated that difference average of phosphorus factor (before and after training) of object and control group, hence the research theory (i.e. effect of diet training on serum phosphorus factor) was not causative in serum of patients under hemodialysis treatment (17).As the results, Scalter and France showed (1998) that diet and medicinal training was effective on phosphorus blood levels in patients under HD treatment (18). However Pervant and colleague study results indicated that diet training does not have effect on blood phosphorus level in CKD patients who are under HD treatment (19). Diet training is impressive in serum calcium of patients undergoing HD. As T-test showed, there was no significant statistical difference between two-month calcium averages before and after treatment group training. Independent t-test indicated there was not significant statistical difference in difference average of treatment group before and after training. Therefore the hypothesis is not confirmed. Sclater and France (1998) research results indicated that diet and medical training had an impact on the average blood calcium in patients under-treatment with HD by high levels of phosphorus (P=0/2) (20). In the other hand, results of Eshvandi (1374) study related to the effect of self-care training on reduction of physical problems in HD under-treatment patients showed that this kind of training had no impact on calcium blood levels. Diet training had an impact on amount of weight gain between two sessions of HD. Paired t test (p=0/0001) demonstrated there was no significant statistical difference between two-month dialysis sessions before and after training in treatment group. Independent t-test (p=0/000) indicated that there was a significant statistical difference in difference average of control group between two sessions of dialysis before and after training. As a result, above hypothesis is confirmed.

As Weapwend (1991) results showed a significant statistical difference existed between average weight gain and two sessions of dialysis before and after training (p<0/5) (21). Eshvandi's study results were also impressive on reducing physical problems of HD patients between two sessions of dialysis in Iran (22).

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Determining the Psychometric Properties of Early Maladaptive Schemas Test in Patients with Coronary Heart Disease and comparing them with the ones in Healthy individuals

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Abstract

Objectives: The present study aimed to examine the validity and reliability of early maladaptive schemas questionnaire in patients with coronary heart disease and compared early maladaptive schemas in patients with coronary artery disease and healthy individuals.

Method: In this study, causal-comparative method and factor analysis were used. The population of this study consisted of all 45-60 year old individuals who were candidates for coronary angiography and referred to health promoting clinic affiliated to Rajaie Heart Hospital in Tehran. 400 and 150 of them were respectively selected as patients with coronary heart disease and healthy individuals without coronary heart disease patients through convenient sampling method. To collect the data, the early maladaptive schemas questionnaire was used and finally the data was analyzed by using appropriate statistical methods and was further investigated by Factor and SPSS 22 software.

Findings: According to the results of exploratory factor analysis used to investigate the validity of structure, 14 factors were extracted from the sample patients with coronary heart disease. Cronbach's alpha for the whole questionnaire was estimated 0.94. The results with consistency of the total scale and fourteen factors indicated high level of reliability. Also, there were significant differences between these two groups in subscales of defectiveness / shame, emotional deprivation, social isolation / alienation, self-sacrifice, dependence / incompetence, abandonment / instability, subjugation, undeveloped self, mistrust / abuse, failure, unrelenting standards, emotional inhibition and self-restraint / insufficient self-discipline (p<0.003)and just in the subscale of entitlement / grandiosity. There was no significant difference between the groups. According to the average scores of subscales, patients with Coronary Heart Disease were at higher levels compared to healthy individuals in all mentioned subscales. The greatest and least differences between the groups were observed in subscales of undeveloped self and self-restraint, respectively.

Results: According to the acceptable level of validity and reliability of early maladaptive schemas questionnaire in patients with Coronary Heart Disease, this tool can be useful to research and identify early maladaptive schemas in patients with Coronary Heart Disease.

Keywords: Early maladaptive schemas, Coronary heart disease

Introduction

Today, the study of disorders taking roots in psychological phenomenon is highly regarded. Most psychologists believe that a set of psychological factors, especially personality factors, can predispose a person to psychosomatic diseases (Sadock and Sadock, 2010; quoted by Yousefi, 2014). An important category of major fundamental personality factors is early maladaptive schemas (EMS).They have been defined as self-damaging emotional and cognitive patterns that were formed at the beginning of evolution of the mind and repeated in the life cycle (Young, Klosko, Weishaar, 1994, translated by: Hamidpour and Andouz, 2007). Early maladaptive schemas are cognitive, emotional patterns and self-damaging physical reactions that are shaped in the childhood and repeated during the life span (Young, 2006; quoted by Ghosi et al.).Young introduces eighteen maladaptive schemas in five domains of

schema that are as follows: disconnection and rejection, impaired autonomy and performance, impaired limits, other-orientation and excessive vigilance (Young et al., (2003); quoted by Nazari et. al, 2015).EMSs can be created through primary annoying experiences and later in similar situations provoke a response that was appeared in the past (Schmidt and Young, 1999; quoted by Pourmohammad et al. 2013). Patients during early stages of their lives in order to adapt to schemas, create responses, and inconsistent coping styles to avoid experiencing severe and frustrating excitements. These three coping styles include excessive compensation, avoidance and submission. Dysfunctional nature of schemas usually appear when patients in the course of their daily lives and interactions with others act in a way that their schemas can be verified, even if their first impression is not correct. Early maladaptive schemas are often considered as underpinning of the chronic symptoms of disorders (axis I), such as anxiety, depression, drug abuse and psychosomatic. When people are faced with an environment reminiscent of their childhood environment, their schemas will be motivated and as soon as this happens, the person is severely affected and dominated by negative emotions (Young, Klosko, Weishaar, 1994; translated by Hamidpor and Andouz, 2007). Against these external stimuli in everyday life, people always use regular strategies to mitigate the severity or the type of their emotional experiences or the calling events of excitement. The results of different studies show that emotion regulation has perfectly integrated with the psychopathological patterns (Aldao, Nolen-Hoeksema, Schweizer, 2010).

Many studies have shown that mood disorders, negative emotions and social isolation provide the context of developing a variety of physical ailments (Campbell-Sills, Barlow, 2007; quoted by Ahmadi et al., 2014). These schemas at the deepest level of knowledge often act out awareness level and psychologically make a person vulnerable to disturbances such as depression, anxiety, ineffective relationships, drug addiction, behavioral disorders and anti-social behavior and psychosomatic disorders (Young, 1999; quoted by Khodabakshi Kolayi, 2014). In general we can say that schemas have the ability to predict public health symptoms (Shahamat, 2010). Among psychosomatic disorders is cardiovascular disease that according to World Health Organization report, mortality rates and the risk of cardiovascular disease in Asian as well as developing countries have been raised dramatically and by 2020 the incidence of these diseases will increases as much as 120% in women and 137% in men. According to the report provided by the Ministry of Health in Iran, coronary artery disease (CAD) is the leading cause of death and is the second important cause according to missed years of life (Nagavi, 2006; quoted by Shakeri, 2006). Coronary heart disease is one of the cardiovascular disorders that is caused by the lesion and occlusion of heart arterial coronary. In this disorder, the wall of one or more coronary arteries of the heart is blocked partially or completely due to sedimentation called plaque (fatty material or fiber) and blood flow to different parts of the heart is stopped permanently or temporarily (Schroder, Schwaezer, 2005, quoted by Sheikhi, 2012). Bio-psycho-social model integrates two biological-medical and social-psychological perspectives to explain sickness and health. According to this model, biological factors can be of genetic predisposition, food style and biochemical disequilibrium and psychological factors are behaviors, individuals' personality and finally social factors include family members, home settings and events. So it can be accepted that the disease is multifactorial in etiology and treatment (Phares, Tiomothy, 2007; quoted by Khanjani, 2010). Many researches showed that negative emotion, anger and hostility in addition to coronary heart disease incidence will exacerbate it (Todaro, Shen, Niaura, Spiro, Ward, 2003). Based on the studies, depression, anxiety, personality traits, social isolation, chronic stress (Rozanski, etal., 1999) and expression of emotions or repression of them (Friedman, 1975; quoted by Sheikhy, 2012) are important factors affecting this disease. So it gradually becomes more obvious that psychological variables are seriously effective in physical illnesses such as coronary heart disease, both at the beginning of it and its continuation in all the life courses (Ahmadi et al., 2014). Thus, according to in-depth impact of early maladaptive schemas on the thoughts and emotions that can lead to psychosomatic disorders and given that there are a few recommendations for the consideration of the role of schemas despite their central role in the diagnosis and treatment of personality disorders (Bricker, etal., 1993; quoted by Divandari, 2007) and since cardiovascular disease is considered as psychosomatic disorder, a combination of biological and psychological factors should be noted in the investigation of factors contributing to its emergence (Zeinali, Ashrafian, Beirami, 2011).In this study, the psychometric properties of the early maladaptive schemas questionnaire for coronary artery disease (CAD) was investigated. This study in addition to comparing the early maladaptive schemas in patients with coronary artery disease and non-coronary heart disease participants aimed to answer this question: whether the early maladaptive schemas test have validity and reliability to be used for patients with coronary artery disease patients or not.

Method

In this study, factor analysis and causal-comparative methods were used. The population of this study consisted of all 45-60 year old individuals who were candidates for coronary angiography and referred to health promoting clinic affiliated to Rajaie Heart Hospital in Tehran. Since access to the patients with coronary heart disease is difficult, 400 patients with coronary artery disease (CAD) were selected by convenience sampling after psychiatrists diagnosed their disease through angiography. In order to determine the sample size for coronary artery disease patients,5 participants were considered for each question according to the number of questions in the questionnaire (75 questions) (Tabachnick, Fidell, 2007).Accordingly, by taking into account the drop-out of participants, the sample size was considered to 400. Finally, to compare the early maladaptive schemas among people with coronary artery disease and without coronary artery disease, the sample size of people without non-coronary heart disease (don't suffer coronary heart disease according to the psychiatrists' diagnosis after angiography) was considered 150 that they were selected by convenience sampling method. This sample size is appropriate for multivariate variance analysis, and is close to the number of dependent variables in each house (Ellis, translated by Firoozbakht, 2004). Early maladaptive schemas questionnaire was applied on patients admitted at Shahid Rajaie Heart Hospital in Tehran for coronary angiography (The questions were read by the examiner for participants). After determining the results of angiography and diagnosis of coronary heart disease by a physician, a group was considered as patients with coronary heart disease and another group was considered as people without coronary artery disease. Finally, data was analyzed with statistical methods.

Young's Early Maladaptive Schema Questionnaire
Young (1996) stated that early maladaptive schemas are the results of negative interpersonal experiences during the early years of life inside and outside the family. Young's Schema Questionnaire is made based on clinical specialists' observations. This self-report questionnaire contains 205 items and it is designed to measure sixteen early maladaptive schemas. But the shorter form of the questionnaire has been more welcomed because of having the characteristics of the original questionnaire and the ease of implementation. Young's Schema Questionnaire-Short Form (YSQ-SF) is designed by Young (1998) to measure 15 Schema which are as follows: emotional deprivation (a feeling that due to it, an individual believes that he/she does not have suitable emotional support), abandonment / instability (a feeling that an individual believes that important people will leave him in his life), mistrust / abuse (a feeling that an individual believes that others will tell lie to him and benefit from him), social isolation / alienation (feeling of being detached from others), defectiveness / shame (individual's believe with regard to this issue that he has deficiencies and he is useless), failure (the belief that he is less successful than others), dependence / incompetence, (the feeling that an individual is not able to care about himself), vulnerability to harm or illness (believing that the imminent catastrophe will happen), undeveloped self, (severe emotional connection and too closeness with one of the significant people in their live at the expense of losing the individuality), subjugation, (Feeling of coercion to excessive transfer of his control to others), self-sacrifice, (excessive focus on meeting the needs of others), emotional inhibition (the excessive inhibition of spontaneous action, feeling or communication), unrelenting standards / hyper criticalness (intensive efforts for success), entitlement / grandiosity (the belief that one is superior to other people and not bounded by the rules of mutual relationships), insufficient self-control / self-discipline (not tolerating failures in achieving personal goals)and obtaining high score in a certain subscale more likely indicates a maladaptive schemas for that person (Sadoughi and Vafayi, 2008).The short form of this questionnaire is a 75-question tool to assess early maladaptive schemas with a 6-option Likert scale (from completely right to completely false). Young designed the questionnaire by the means of the original 205-question questionnaire. In the first comprehensive study about its psychometric properties, Cronbach's alpha was estimated from 0.83 to 0.96 for each maladaptive schema measures and test-retest coefficients in non-clinical population was from 0.53 to 0.82.This questionnaire has shown good discriminated validity with psychological distress, self-worth, cognitive vulnerability measures to depression and personality disorders semiotics (Young and Brown. 1994). The factor analysis of short version of the questionnaire is consistent with the factor analysis of long version and confirms the assessment of 15 factors (Schema). Internal consistencies of subscales have been reported very well (Cronbach's alpha 0.7 to 0.93) (Welburn, et al., 2002). Waller, Meyer, Ohanian (2001) reported that internal consistency of the scale was 0.96. Also internal consistency for all subscales was estimated greater than 0/80. Test-retest reliability of subscales was obtained from 0.50 to 0.82. Sadoughi and Vafayi (2008) reported internal consistency of subscales from 0.62 to 0.90 and the total score of scale as much as 0.94.

Data analysis method

- **Construct validity:** In our study factor analysis method was used to collect evidences related to the construct validity of the early maladaptive schemas. Principal component analysis by using varimax rotation was applied for data factor analysis, and before factor analysis, KMO and Bartlett's tests were performed on the data.
- **Reliability (internal consistency):** In this section, the internal Harmonized Index of questions i.e. interference of all the questions in terms of measuring a common characteristic was examined and calculated by Cronbach's alpha coefficient.
- **Significant difference of early maladaptive schemas between patients with coronary artery disease and participants without coronary artery disease (concurrent validity):** Multivariate analysis of variance was used to measure significant difference between patients with coronary artery disease and participants without coronary artery disease in early maladaptive schemas.

Findings

This study aimed to examine the psychometric properties of early maladaptive schemas in patients with coronary heart disease patients compared with healthy individuals. The sample group consisted of 550 45-60 years patients who admitted at Shahid Rajaie Heart Hospital for angiography. According to the results of angiography, 400 people were diagnosed as patients with coronary artery disease and 150 peoples were selected as subjects without coronary artery disease and sample group responded to early maladaptive Schema (EMS) questionnaire. The collected data were analyzed through SPSS 22 and Factor software .According to research design, and in order to answer the research questions, exploratory factor analysis was used to assess the validity of early maladaptive schemas measure, Cronbach's alpha tests was used to check the validity of the test and multivariate analysis of variance was used to compare the two groups in the early maladaptive schemas. These results are presented in the following pages.

Descriptive findings

According to the findings, 60 years old participants had the highest percentage (47.3) in the group of patient with coronary heart disease and 45 years old had the highest percentage (89.4) in the group of participants without coronary artery disease. Also, in the group of patients with coronary heart disease, the number of men (51.7) was greater than the number of women (48.3), but in the group of participants without coronary artery disease, the percentage of men (49.3) was less. According to the results, individuals who had the degrees lower than high school diploma, had the highest percentage (59.0) in the group of patients with coronary artery disease.

Examination of **variables distribution normality**

Table 1 shows the normality of variables. As it can be seen in this table, skewness and kurtosis of variables are in the range of about +2 to -2. These results suggest the normality of the variables distribution. It can be concluded that the data are normally distributed.

Table 1: Examination of variables distribution normality using skewness and kurtosis statistics

	Variables	Mean	SD	Skewness	Skewness error	kurtosis	Kurtosis error
Patients with coronary heart disease	Emotional Deprivation	17/64	10/74	0/012	0 / 122	-1/80	0 / 243
	Insufficient Self-Control / Self-Discipline	26 / 08	6 / 05	-1/81	0 / 122	2/24	0 /243
	Abandonment / Instability	17/ 19	9 / 45	-0 / 018	0 / 122	-1 / 56	0 / 243
	Mistrust / Abuse	13/49	7/54	0/214	0 / 122	-1/50	0 / 243
	Social Isolation / Alienation	13/12	11/07	0/643	0 / 122	-1/480	0 / 243
	Defectiveness / Shame	19/08	9/31	-0/397	0 / 122	-1/323	0 / 243
	Failure	13/47	8/52	0/260	0 / 122	-1/694	0 / 243
	Dependence / Incompetence	18/61	8/09	-0/437	0 / 122	-1/136	0 / 243
	Vulnerability To Harm Or Illness	21/26	8/22	-0/655	0 / 122	-1/060	0 / 243
	Undeveloped Self	19/79	9/39	-0/045	0 / 122	-1/833	0 / 243
	Subjugation	26/80	5/69	-2/032	0 / 122	3/846	0 / 243
	Self-Sacrifice	18/21	8/81	-0/135	0 / 122	-1/338	0 / 243
	Emotional Inhibition	22/63	8/06	-0/648	0 / 122	-0/948	0 / 243
	Unrelenting Standards / Hyper criticalness	13/71	8/81	0/658	0 / 122	-1/160	0 / 243
	Entitlement / Grandiosity	17/34	7/11	0/116	0 / 122	-0/617	0 / 243
	Insufficient Self-Control / Self-Discipline						
Participants without coronary heart disease	Emotional Deprivation	10/56	5/03	0/922	0/241	0/189	0/478
	Insufficient Self-Control / Self-Discipline	13/72	6/02	0/239	0/241	-1/158	0/478
	Abandonment / Instability	11/32	4/90	0/534	0/241	0/261	0/478
	Mistrust / Abuse	8/62	3/16	1/095	0/241	1/375	0/478
	Social Isolation / Alienation	7/18	2/85	1/315	0/241	1/455	0/478
	Defectiveness / Shame	9/17	4/06	1/257	0/241	2/101	0/478
	Failure	8	4/21	1/594	0/241	2/222	0/478
	Dependence / Incompetence	10/04	5/49	1/209	0/241	0/900	0/478
	Vulnerability To Harm Or Illness	10/05	5/33	1/150	0/241	1/834	0/478
	Undeveloped Self	11/92	4/12	0/730	0/241	1/109	0/478
	Subjugation	19/12	5/11	0/080	0/241	-1/176	0/478
	Self-Sacrifice	10/72	5/50	0/582	0/241	-0/582	0/478
	Emotional Inhibition	17/18	5/60	0/444	0/241	-0/257	0/478
	Unrelenting Standards /	13/95	4/28	0/075	0/241	-0/861	0/478

Hypercriticalness Entitlement / Grandiosity	13/08	4/67	0/562	0/241	-0/481	0/478
Insufficient Self-Control / Self-Discipline						

Results

Checking the construct validity of early maladaptive schemas measure for patients with coronary artery disease (exploratory factor analysis)

Table 2 shows the statistics related to factor loading of the correlation matrix. As can be seen in the table, Bartlett's test is significant (P=0/000) KMO value is also equal to 0/685, which indicates that the sample size is sufficient.

Table 2: Bartlett's test and Kaiser-Meyer-Olkin (KMO)

Statistic	**df**	**Bartlett test**	**KMO**	**Sig. level**
Value	2775	52364 / 902	0 / 685	0/000

In the study, principal component analysis with varimax rotation was used to determine the saturation of the original early maladaptive schemas scale. Table 3 shows the variance explained by the factors after the initial rotation. As shown in the table, Eigenvalues of 19 factors were greater than one. In this table, in addition to Eigenvalues, percentage of variance and cumulative variance percent are shown that are related to the extractive factors. According to Table 3 these 19 factors totally explain 81.53% of the early maladaptive schemas variance.

Table 3: Value of variance explained by factors after the initial rotation

Components	The Primary special value			Total square of extracted factors loads			Total square of rotated factors loads		
	Eigenvalue	Percentage of variance	cumulative percent	eigenvalue	Percentage of variance	cumulative percent	eigenvalue	Percentage of variance	cumulative percent
1	17/115	22/820	22/820	17/115	22/820	22/820	5/340	7/121	7/121
2	5/457	7/276	30/096	5/457	7/276	30/096	4/559	6/079	13/200
3	4/613	6/151	36/274	4/613	6/151	36/247	4/176	5/568	18/768
4	4/057	5/410	41/656	4/057	5/410	41/656	4/111	5/481	24/249
5	3/571	4/761	46/417	3/571	4/761	46/417	4/072	5/429	29/678
6	2/897	3/863	50/280	2/897	3/863	50/280	3/999	5/332	35/011
7	2/807	3/743	54/023	2/807	3/743	54/023	3/936	5/248	40/259
8	2/533	3/377	57/400	2/533	3/377	57/400	3/700	4/933	45/192
9	2/288	3/051	60/451	2/288	3/051	60/451	3/583	4/777	49/969
10	2/137	2/849	63/300	2/137	2/849	63/300	3/466	4/621	54/590
11	2/103	2/804	66/104	2/103	2/804	66/104	3/392	4/523	59/114
12	2/030	2/707	68/810	2/030	2/707	68/810	3/136	4/181	63/294
13	1/785	2/380	71/191	1/785	2/380	71/191	3/064	4/685	67/379
14	1/689	2/252	73/443	1/689	2/252	73/443	2/724	3/632	71/012
15	1/595	2/127	75/570	1/595	2/127	75/570	2/354	3/139	74/151
16	1/253	1/671	77/241	1/253	1/671	77/241	1/631	2/175	76/326
17	1/145	1/527	78/768	1/145	1/527	78/768	1/410	1/871	78/205
18	1/056	1/408	80/176	1/056	1/408	80/176	1/333	1/777	79/982

| 19 | 1/022 | 1/363 | 81/539 | 1/022 | 1/363 | 81/539 | 1/168 | 1/557 | 81/539 |
| 20 | 0/987 | 1/316 | 82/855 | | | | | | |

Eigenvalue identified 19 factors but according to the scree design (graph 1), 15 factors can be extracted.
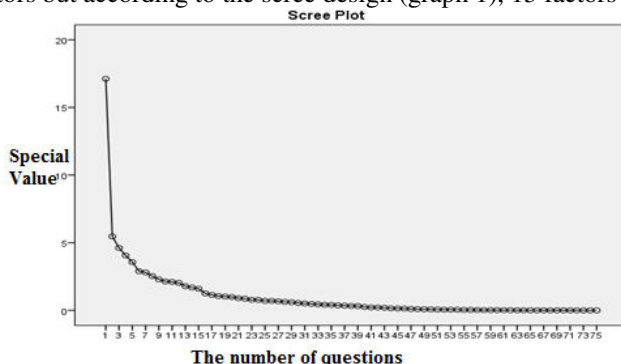
Diagram 1: Inclined diagram of set of questions of early maladaptive schemas

As it can be seen in the diagram 1, from fifteenth factor, the screw plot is broken and 15 factors are extractable. Then the parallel analysis technique is used to determine the number of factors. In this method, instead of emphasizing eigenvalue, common variances are examined (Horn, 1965, quoted by Hejazi et al.). In this study, parallel analysis was performed by using the Factor software.

Table 4: Parallel analysis results based on minimum rank factor analysis

Factors	Real-data % of variance	Mean of random% of variance	95 percentile of random % of variance
1	**23/4	3/0	3/1
2	**7/5	2/9	3/0
3	**6/2	2/8	2/9
4	**5/3	2/7	2/8
5	**4/7	2/6	2/7
6	**3/9	2/6	2/6
7	**3/7	2/5	2/6
8	**3/4	2/4	2/5
9	**3/1	2/4	2/5
10	**2/8	2/3	2/4
11	**2/8	2/3	2/3
12	**2/7	2/2	2/3
13	**2/4	2/2	2/2
14	**2/3	2/1	2/2
15	*2/1	2/1	½
16	1/6	2/0	½
17	1/5	2/0	½

The obtained results from parallel analysis (PA) based on minimum rank factor analysis (MRFA) are shown in Table 4.Comparing the mean or 95% of common variance with the percentage variance of actual data shows that the percentage of actual data in first 15 factors is greater than 95% of shared extracted random variance, and as can be seen, from the fifteenth factor onward, the average value of common random variance and 95% percentile of random variance factor is greater than the actual data, so in order to continue the analysis, first 15 factors can be maintained (In this table, 17 factors has been mentioned). But up to the 14th factor were acceptable with a higher percentage, finally 14 factors can be taken into account. After the reimplementation of the factor analysis with 15 factors, since the 15th factor contained only two questions, this factor was also deleted and finally 14 factors were considered. Table 5 shows the Eigenvalue of each factor. Eigenvalue of each factor is the sum of squares of factor loadings that represents the contribution of each factor in explaining the total variance of questions. As can be seen in the table,

the first factor with eigenvalue of 5/145, explained 7/246 of the total variance that based on principal component analysis features, it has the greatest contribution in explaining the total variance. And none of other factors can explain greater variance compared to the first factor. According to Table 5, 76/198 percent of the total variance can be explained by the extracted 14 factors.

Table 5: Eigenvalue and rotated factor loading of 14 factors with the value of greater than one

Factor	eigenvalue	Percentage of variance	Cumulative percentage
1	5/145	7/246	7/246
2	4/632	6/524	13/770
3	4/318	6/082	19/852
4	4/295	6/050	25/902
5	4/075	5/739	31/641
6	4/036	5/685	37/325
7	4/019	5/660	42/986
8	3/970	5/592	48/578
9	3/841	5/410	53/988
10	3/683	5/187	59/176
11	3/598	5/067	64/243
12	3/347	4/714	68/957
13	2/692	3/791	72/748
14	2/450	3/450	76/198

After determining the number of relevant extractable factors, based on the explained variance and screw diagram, in order to reach the simple structure, 14 factors were rotated by varimax method. Results reached simple structure after 25 experimental rotation. It should be noted that questions 16, 27, 33, 46, 51, 64.60, 66, 72 and 75 were deleted due to their absence in any of the 14 factors. Given that the minimum factor was considered 0.33, the factor loads less than it were not observed in extracted factors matrix using principal components analysis after the rotation.

Naming the factors

Simple structure of 14 rotation factors of early maladaptive schemas after rotation and the questions having loads on this factor were shown in table 6.

Table 6: Extracted factors of early maladaptive schemas scale

Subscales	Question no.	The number of Questions
Defectiveness / Shame	21 ،25 ،23 ،22 ،24	5
Emotional Deprivation	5 ،4 ،3 ،1 ،2	5
Social Isolation / Alienation	38 ،36 ،40 ،37 ،20 ،19 ،18	7

Self-Sacrifice	54 ،53 ،55 ،52	4
Undeveloped Self	34 ،26 ،71 ،31 ،35 ،32	6
Abandonment / Instability	9 ،10 ،6 ،7 ،8	5
Subjugation	50 ،47 ،49 ،48	4
Entitlement / Grandiosity	69 ،70 ،68 ،67	4
undeveloped self	65 ،41 ،42 ،44 ،43 ،45	6
Mistrust / Abuse	15 ،13 ،14 ،12 ،11	5
Failure	29 ،30 ،28	3
Unrelenting Standards / Hypercriticalness	17 ،61 ،63 ،62	4
Emotional Inhibition	59 ،58 ،56 ،57	4
Insufficient Self-Control / Self-Discipline	39 ،73 ،74	3

The validity of the early maladaptive schemas questionnaire among the patients with coronary heart disease after conducting factor analysis
Using Cronbach's alpha coefficient is one of the methods used to estimate the reliability. In this way, the closeness of estimated alpha obtained closeness to hundred which shows higher reliability and validity of the questionnaire. As a general rule, the alpha value for an index is usually considered 0.7 (Karami, 2013).Table 7 shows the Cronbach's alpha value of early maladaptive schemas subscales after exploratory factor analysis. As it can be seen in the table, the validity of variables and the whole scale is acceptable.

Table 7: Reliability coefficients of research variables after conducting Factor analysis

No.	Concept	Number of items	The alpha coefficient
1	Defectiveness / shame	5	0/993
2	Emotional deprivation	5	0/944
3	social isolation / alienation	7	0/879
4	self-sacrifice	4	0/993
5	undeveloped self	6	0/904
6	abandonment / instability	5	0/866
7	subjugation	4	0/985
8	entitlement / grandiosity	4	0/963
9	undeveloped self	6	0/863
10	mistrust / abuse	5	0/879
11	failure	3	0/983
12	unrelenting standards / hypercriticalness	4	0/889
13	emotional inhibition	4	0/854

14	insufficient self-control / self-discipline	3	0/671
15	The total scale	65	0/944

Is there a difference between patients with coronary artery disease and healthy people in the early maladaptive schemas?

In order to compare patients' coronary artery disease and participant without coronary heart disease in early maladaptive schemas after factor analysis, the multivariate analysis of variance (MONOVA) was used to compare these two groups (independent variables) in early maladaptive schemas (dependent variables).That 150 participant are patients with coronary artery disease and 150 participants from non-coronary heart disease group were selected. In fact, a one-way multivariate analysis of variance was used to evaluate differences between patients with coronary heart disease and participants without coronary heart disease in the early maladaptive schemas. The first hypothesis test was performed to check the assumptions of normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices and multivariate linearity according to Tables 8 and 9and no serious violations was observed. According to Table 8, the significance level was greater than 0.001, which represents lack of homogeneous violation in the variance-covariance matrix. Also, according to Table 9, since the significance level for each variable is greater than 0.05, equality of variances for each variable has been observed. According to Table 10, there was no statistically significant difference in terms of combined dependent variables, Lambda Wilk's= 0.387, F=32.184, 0.05>P=0.000.When the results of the dependent variables were considered separately, according to Table 11, subscales that were statistically significant by using the Bonferroni modified alpha 0/003, were identified as follows: emotional deprivation, abandonment / instability, mistrust / abuse, social isolation / alienation, defectiveness / shame, failure, dependence / incompetence, vulnerability to harm or illness (belief in the imminent catastrophe), undeveloped self, subjugation, self-sacrifice, emotional inhibition, unrelenting standards / hyper criticalness , insufficient self-control / self-discipline. And the only subscale that was not significantly different between the groups was entitlement / grandiosity. Also studying the mean score showed that patients with coronary heart disease were at higher levels than people without coronary heart disease in all the mentioned subscales. The greatest and least differences between the groups were observed in subscales of undeveloped self and self-restraint, respectively. In other words, since the average score of patients with coronary heart disease group was greater than the average score of people without coronary heart disease group, it can be said that the early maladaptive schemas test has also concurrent validity (Sharifi, 2011).

Table 8: Reviewing the assumption of homogeneity of variance-covariance matrices (Test Box's)

Box's M	1387/40
F	12/56
Sig	0/031

Table 9: Investigating the equality of per variable variance (Levene test)

Variable	F	Sig. level

Defectiveness / shame	698/71	0/404
Emotional deprivation	308/74	0/601
social isolation / alienation	95/77	0/599
self-sacrifice	0/269	0/604
undeveloped self	267/53	0/517
abandonment / instability	0/170	0/680
Subjugation	572/195	0/670
entitlement / grandiosity	273/121	0/439
undeveloped self	81/96	0/612
mistrust / abuse	135/76	0/649
Failure	217/57	0/584
unrelenting standards / hyper criticalness	101/12	0/487
emotional inhibition	30/11	0/615
insufficient self-control / self-discipline	65/16	0/624

Table 10: Multivariate comparison of patients with coronary heart disease and participants without coronary heart disease in the early maladaptive schemas

	Value	F	Sig. level
Wilk's Lambda	0/387	32/184[b]	0/000

Table 11: Univariate comparison of patients with coronary heart disease and participants without coronary heart disease in the early maladaptive schemas

	Coronary heart disease patients		Healthy participants			
Variables	Mean	SD	Mean	SD	F	Sig. level
Defectiveness / shame	13/36	11/07	7/28	2/85	341/649	0/000
Emotional deprivation	17/43	10/74	10/70	5/03	649/214	0/000
social isolation / alienation	24/97	11/31	13/70	6/78	1071/600	0/000
self-sacrifice	21/87	4/84	15/86	4/42	5033/935	0/000
undeveloped self	18/97	11/52	11/86	5/00	683/606	0/000
abandonment / instability	25/17	6/06	13/62	6/02	3287/601	0/000
Subjugation	13/81	9/20	8/04	3/69	541/799	0/000
entitlement / grandiosity	9/68	7/80	10/76	3/51	654/381	0/279
undeveloped self	25/49	9/22	13/32	6/01	1599/262	0/000
mistrust / abuse	17/02	9/44	11/38	4/90	846/088	0/000
failure	12/69	6/57	6/04	3/01	770/345	0/000
unrelenting standards / hyper criticalness	15/95	7/70	13/26	4/02	1347/378	0/000
emotional inhibition	14/08	7/75	8/80	4/81	794/514	0/000
insufficient self-control / self-discipline	9/30	4/62	6/92	2/92		0/000

Discussion and conclusion

This study aimed to investigate the validity and reliability of early maladaptive schemas and then compare the early maladaptive schemas in patients with coronary heart disease and participants without coronary heart disease. In this regard, early maladaptive schemas questionnaire was used. The validity and reliability of obtained data were investigated by using exploratory factor analysis and Cronbach's alpha coefficient and finally two groups were

evaluated by using variance analysis. Then, according to the findings of the study, the research questions was addressed.

How is the validity of the early of maladaptive schemas in the patients with coronary heart disease?
In this study, before performing the factor analysis, Bartlett's test was used to evaluate the correlation matrix that had a significant value (p=0/000<0/05) and the amount of KMO was equal to 0/685 (0.6 or higher), that indicated the adequacy of the sample size (Hooman, 2009). After initial rotation, Eigenvalue of 19 factors was greater than one that totally explained 81/53% of the total variance of the early maladaptive schemas, but according to the screen chart, 15 factors were extractable which were identical with results of parallel analysis. After the reimplementation of the factor analysis with 15 factors, since the 15th factor had only two questions it was removed (Hooman, 2009) and finally 14 factors were considered that explained 76/20% of the total variance. Also the questions 27, 33, 46, 51, 64.60, 66, 72 and 75 were excluded due to their absence in any of the 14 factors. The agents were labeled and the questions related to each agent were identified. These 14 factors were:
1st factor: defectiveness/shame, 2nd factor: emotional deprivation, 3rd factor: social isolation/alienation, 4th factor: self-sacrifice, 5th factor: dependence / incompetence, 6th factor: abandonment / instability, 7th factor: subjugation, 8th factor: entitlement / grandiosity, 9th factor: undeveloped self, 10th factor: mistrust / abuse, 11th factor: failure, 12th factor: unrelenting standards / hyper criticalness, 13th factor: emotional inhibition, 14th factor: insufficient self-control / self-discipline.
Of fourteen factors, nine factors (emotional inhibition, emotional deprivation, self-sacrifice, abandonment/instability, subjugation, entitlement/grandiosity, mistrust/abuse, failure, and defectiveness/shame) are similar to factors obtained in Young's (1998) study. The remaining five factors in this study appeared in a combined form. The third factor appeared as a combination of social isolation / alienation and vulnerability to harm or illness factors. In fact, it can be stated that person may prefer the withdrawal and social isolation due to the fear of vulnerability to loss. Koskela (1999) believed that the isolation and fear of vulnerability have relationship with each other. Roshanpour and Romani's (2011) research also shows that there is a significant relationship between social isolation and social damage. So the name of this factor was considered as social isolation / alienation. The fifth factor is a combination of dependence / incompetence, failure and insufficient self-control / self-discipline. In other words, it can be said that this feeling that an individual cannot do his work and always fails, can make an individual dependent on others to do life affairs. Also, if the person is not patience and motivated to do the common life affairs, he/she will be dependent on others in order to escape doing them. According to Ellis (Translation by Firoozbakht, 2004), dependence is also one of irrational beliefs in which a person believes that he could not always do the tasks successfully by himself and thus a stronger person than him should be present by him and he should depend on him in all the things. In Ahi's (2007) research, dependence and failure factors also appear as a combination. The ninth factor was a combination of two factors that they were undeveloped self and unrelenting standards / hyper criticalness. In fact, if the individual's life and the lives of those around him are tied heavily to each other these people can be influenced by each other's mistakes and even blame themselves for their mistakes. According to Ellis (translation by Firoozbakht, 2004) blaming is an irrational belief through which a person thinks that he must be blamed because of the mistakes that he commits against himself or others. Accordingly, the name of this factor is considered as undeveloped self. The twelfth factor was obtained as a combination of factors such as unrelenting standards and social isolation / alienation, in fact, someone who is willing to do things in the best possible way and always strives to be top person, knows himself different from others. Having high expectations of him/herself is a constant source of stress by which an individual often faces with failure. These people consider themselves to be flawless. This affects dysfunctional and maladaptive coping styles. Also having high expectations of him/herself has relationship with close and interpersonal relationship (Ashbay, 2004).Accordingly, the name of this factor was considered unrelenting standards. The fourteenth factor appeared as a combination of factors such as restraint / insufficient self-discipline and vulnerability to harm or illness. In fact, the person cannot have proper planning to achieve his long term goals and he prefers to ignore it. One of the reasons for this is the fear of facing problems. It is another irrational belief, i.e. the avoidance of problems. In fact, the person thinks that ignoring the problems of life and shirking responsibility are easier and more accurate than facing and engaging with them. Therefore, he follows what is not problematic. This thinking is irrational in order to avoid a task is more difficult and painful than doing it and leads to further problems and dissatisfaction and reduces his confidence (Kazemiyan Moghaddam and Kahky, 2010).Accordingly, the name of this factor was considered as insufficient self-control / self-discipline. In another study on the students of Tehran University by Ahi and colleagues (2007), 11 factors of failure, dependence, social isolation, defectiveness/shame, emotional deprivation, insufficient self-control/self-discipline, subjugation, unrelenting standards/ hyper criticalness, mistrust / abuse, emotional inhibition, self-sacrifice were reported. In a study on the students of Kashmar University by Divandari and colleagues (2007), 11 factors were extracted. These

factors were insufficient self-control / self-discipline dependence / incompetence, failure/ undeveloped self, emotional deprivation, social isolation/alienation, emotional inhibition, mistrust / abuse, self-sacrifice, entitlement, unrelenting standards / hyper criticalness, defectiveness/shame. Velbern et al. (2002) in their study on psychiatric patients admitted to psychiatric clinics reported of similar results so was the study of Ahi and colleagues (2007). Aghayousefi and Amir Pour (2012) in their study on students reported of 11 factors including abuse, vulnerability, loneliness, lack of self-control, entitlement, strict standards, undeveloped self, sacrifice, obedience, defeat and the end factor the defects. In Sadoughi and Aguilar-Vafayi's (2008) research on the students of Shahid Beheshti and Tehran Shahed University also seven full-scale, including three scales with four items, and a scale with two items and two original scales integrated as one factor and findings provided interpretable scales for all fifteen subscales proposed by Young Schema and in total, seventeen factors were identified. Yousefi and Sgirbagi's (2009), in their research on university students in Isfahan, identified 18 factors.

How is the validity of the early maladaptive schemas questionnaire in patients with coronary heart disease?
To determine the reliability of the early maladaptive schemas questionnaire, Cronbach's alpha coefficient was used. The results revealed the acceptable internal consistency of early maladaptive schemas subscales in a sample of patients with coronary heart disease and internal consistency of 14 subscales was estimated in a range of 0/67 to 0/98, also the reliability of the questionnaire was 0/944 which suggests coordination of all items with each other. These results are consistent with the results obtained by Ahi and colleagues (2007) among students of Tehran University in terms of good internal consistency of questions .Also in Aghayousefi and Amirpur's (2012) research on secondary school children, Cronbach's alpha for the whole questionnaire was estimated 0/81 that suggests the good internal consistency of factors. Lee and colleagues also report the reliability of this test in students in medical sciences in Korea (Lee et al., 2015). In a Sadoughi and Aguilar-Vafayi's (2008) research on the students of Shahid Beheshti University and Shahid University in Tehran, internal consistency of 17 subscales was estimated in a range of 0/62 to 0/90 that indicated good internal consistency of the subscales. Also Yousefi and Shirbaghy (2009) in their study on the students in Isfahan reported acceptable reliability for the Young's early maladaptive schemas components.

Is there a difference between patients with coronary artery disease and participants without coronary heart disease in early maladaptive schemas?
The results of multivariate variance analysis showed that there is significant difference between patients with coronary heart disease and participants without coronary heart disease in multivariate comparison of early maladaptive schemas scale (p< 0/05) and in comparing the subscales of emotional deprivation, social isolation / alienation, self-sacrifice, dependence / incompetence, abandonment / instability, obedience, undeveloped self, mistrust / abuse, failure, unrelenting standards, emotional inhibition, entitlement / grandiosity and restraint / insufficient self-discipline using the modified Bonferroni alpha, these two groups were significantly different (p< 0/003) and according to the average score of subscales in the two groups, patients with coronary heart disease enjoyed higher rates of early maladaptive schemas than people without coronary heart disease. The greatest and least differences between the groups were observed in subscales of undeveloped self and self-restraint, respectively. Accordingly, it can be said that the early maladaptive schemas test has concurrent validity. But there is no significant difference between them in terms of entitlement / grandiosity (p >0/003). The results of a study by Ahmadi and colleagues (2014) also showed that the scores of patients with coronary heart disease and people without it were different in primary maladaptive schemas components (emotional deprivation, abandonment / instability, mistrust / abuse, vulnerable to disease , undeveloped self, sacrifice, emotional inhibition, and insufficient self-control / self-discipline)and patients with coronary heart disease had higher scores. This is consistent with the findings of our study. Divandari and colleagues (2007) showed that there was significant difference between male and female students of Islamic Azad University of Kashmar in terms of early maladaptive schemas components (defectiveness / shame, emotional deprivation, social isolation / alienation, entitlement / grandiosity, mistrust / abuse, sacrifice, abandonment / instability, undeveloped self, unrelenting standards, insufficient self-control / self-discipline) and female students earned lower scores than male students. In a study by Yousefi et al (2016) which compared early maladaptive schemas of cardiovascular patients and normal individuals reported that these two groups were significantly different in terms of components such as entitlement / grandiosity, restraint / insufficient self-discipline, emotional inhibition, unrelenting standards and the difference between them was significantly weak in the two components of restraint and emotional inhibition

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Evaluating Anatomical dimensions using cephalometric of 18-20 year-old girls in southern Iran

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Abstract

Background
Anthropometric is the science of measuring body weight which is employed in various fields including anatomy, forensic medicine, and researches relating to cancer, and surgical beauty and this information are used in order to improve the design of tools and equipment.

Materials and methods
People aged 18-20 participated in this study and subjects were choose randomly. Sampling method is alternative one and kind of study is cross sectional one. 366 girls participated in this study. Parameters of head length and width, ears height, head circumference, facial height and width, and body height and weight are measured. Measuring tools are: For measurements, calibre-cephalometer, goniometer, tape measure and balance.

Findings
The results show that there is a meaningful difference between the cephalic parameters (head length and width, ears height, and head circumference) in both groups. Regarding facial parameters (facial length and width), the dominant type in Kermanian girls at the age of 18 to 20-year-old was mesoprosopic, a mesocephalic index

Conclusion
Using anthropometric data have designed in order to study diversity of human physical characteristics and distinguish human races that are important in order to examine appropriately the relation of humane and facilities with environment Anthropometric data play an important role in determining the race and reconstructing form and size of the persons head.

Introductions and goals

Anthropometric is the science of measuring different dimensions of body and using the information in order to determine the shape and size of the place, work, and tools that people used in different military, industrial, educational, sports fields and so on. Characteristics such as the different part of the body height and width and length can be used in order to improve the design of tools, equipment, and etc. Craniofacial anthropometry refers to the accurate physical expression and systematic measurement of human skull bones in forensic medicine, plastic surgery, orthodontics, and archeology and also to determine human races the origin of the anthropometry is very ancient. On the purpose of evaluating appropriately the relations between humans and equipment to the environment, it is necessary to provide an anthropometric database. Anthropometric plays an important role in industrial management and ergonomic design. This information should be collected regularly in every community. Cephalometry is one of the important branches of anthropology that includes measurement of the head, brain growth-dependent dimensions, and shape of the face.

Head length and width are the important dimensions of the skull. Calculating and measuring of these two variables are the skull index. Skeletal system growth and development play an important role in determining the body shape. Bone growth is a complex process and plays a role in brain development, tooth and paranasal sinuses developments in cephalometry. Cephalometry is mainly used by paleoanthropologists and forensic anthropologists in order to estimate gender, race, and ancestry. On the basis of the skull morphology, the first classification is attributed to an anatomist, Professor Andres Retzius (1840).For example, dolichocephalic represents people who have a long skull, and brachycephalic phylum refers to those with a short skull.

In the field of anthropology, forensic and physics, skeletal elements play an important role in sex determination .Pelvis is often used for sex determination; however, cranium as the second is the best option. The analysis of the human skull is the preliminary method in forensic medicine and forensic anthropometry. Information of cephalometric abnormalities play an important role in forensic dentistry for population.

Cephalometric standards for race and gender identification of the victims are carried out with only using a simple assay Cephalometric is an important tool for the forensic anthropologist that is used in order to identify the racial and sexual differences, compare the changes among parents, children and siblings regarding the genetic transmission of inherited characteristics and is largely used for facial and identity reconstruction.

Anthropometric characteristics have a direct relationship with the gender, shape and form of these individuals and these factors are related to each other and manifest the internal structure of tissue components which are affected by genetic and environmental factors. Anthropometric can be divided into somatometry, cephalometry, and osteometry subgroups.

Cephalometry and anthropometry that in most cases are used to determine the sex of skeletal remains such as determining the intercourse of a variety of human bones, including the skull, hip, long bones, scapula, clavicle, metatarsals, metacarpals, brace, patella, vertebrae, and ribs as well. Today, anthropometry plays an important role in the industry of design, ergonomics and architecture in which statistical information about the distribution of body dimensions is used for the optimization of products in a society

On the basis of international cephalic indicators, shape of the head is divided into four groups: Dolicocephalic, Brachicephalic, Mesocephalic, and Hyperbrachiceph groups. Therefore, Australia and South Africa aboriginals haveDolicocepha form, Europe and China have the Mesocephalictype of skull, and the Mongols and the Andaman Islands hsve Brachicephalic skull form.

Comparing among the cephalic forms and index by race, age and gender are important in order to monitor therapy and provision of orthodontic treatment and are valuable in plastic surgery knowledge and reconstructive of the head and facial abnormalities.

Materials and methods

The Present research is done on 366 participants aged 18 to 20 year's old girls. Sampling has done randomly from pre-university high- and boarding-schools in Kerman Province. The measurements include Body height and weight by using goniometer and balance, respectively, cranial circumference, the largest horizontal environment of the head from the forehead and inion, by a calipercephalometry. The head width, the maximum distance between the parietal bone by using caliper cephalometry, and head height, a direct distance between tragus to vertex by using a goniometer,the direct distance between the zygomaticarches as cheek width by using goniometer. Additionally, a caliper has utilized for measuring facial height, as gnathion-nasion direct distance.

\

Table 1 various forms of the subject's head based on international indices in Kerman

	Dolichocephalic variable	Hyper-brachiocephalic	Brachycephalic	Mesocephalic
Number	18	23	136	**159**
Percent	5.3	6.8	40.4	**47.3**

- mesocephal 47.4
- hyperbrachiocephal 6.8
- dolicocephal   5.3
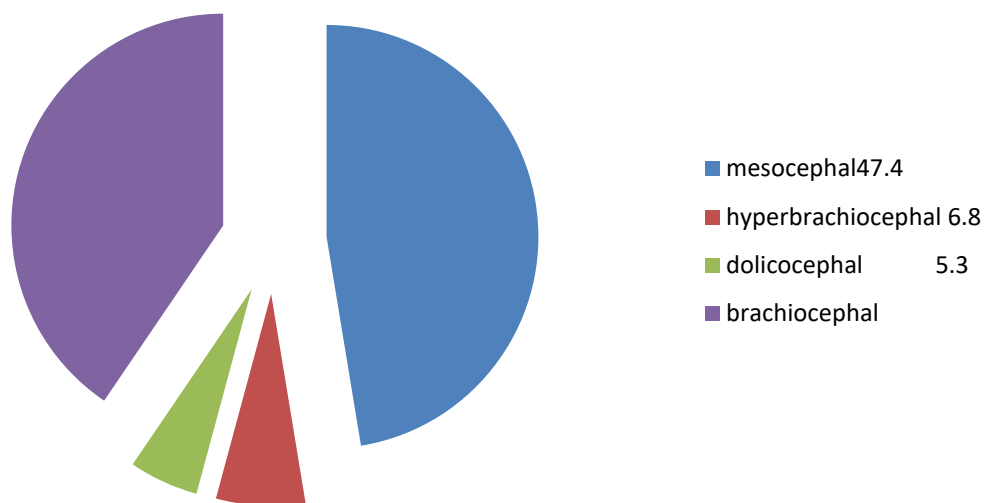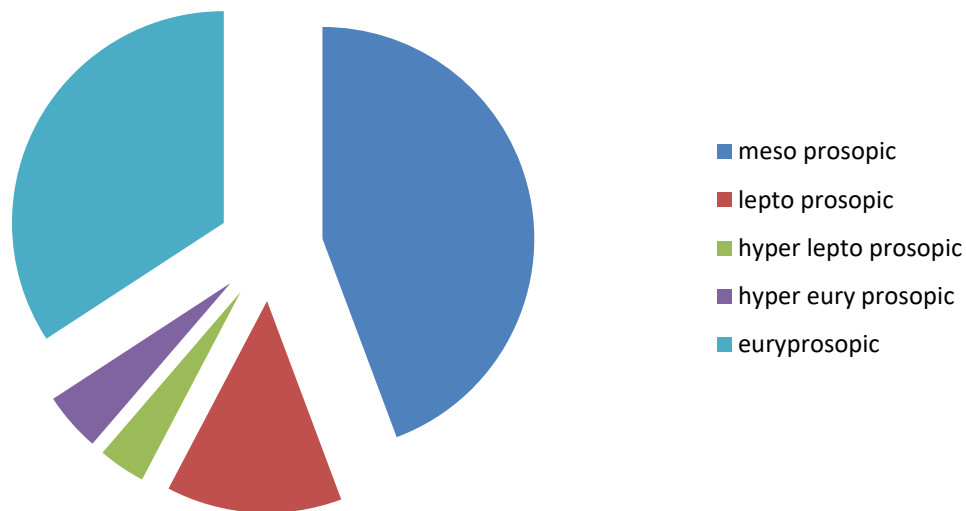- brachiocephal

Table 2 The prevalence of different forms of the face in subjects based on international indices in Kerman

Facial Type	Hyper Leptoprosopic	Leptoprosopic	Mesoprosopic	Euryprosopic	Hyper Euryprosopic
Number	12	45	149	115	**15**
Percentage	3.57	13.39	44.34	34.22	**4.46**

Results and Discussions

Using standard terminology in medicine for both clinical practice and scientific research is essential. In spite of facilitating communication between professionals, this increases the reliability of comparisons in the studies of different areas to a higher level of scientific evidence.

when methods are used in order to determine the quality of changes in the structure of head and facial and extensive kinds of phenotype and special features of people and racial groups in different areas are approved, standard anthropometric data regarding a detailed assessment of the degree of deviation from the samples in plastic surgery, forensics, and medical genetics for diagnosis of dimorphisms or craniofacial abnormalities, attempting to build a data base , covering different populations through international scientific society are necessary.

In a study on 93 fixed corpses comprised of 64 male and 29 female in India at 2016, there was a correlation between skull mass and index in both groups, which was significant in female corpses. Mesocephalic was the most common shape of the head.

A study on 80 Indian corpses containing 45 male and 35 females in 2013 has shown that most of north Indian individuals are dilichocephalicor, Mesocephalic. In this study scull index of female corpses was more than that of male, indicating women have relatively shorter scull in comparison with skull width than men. Dilichocephalic was dominant in men scull while in females it was Mesocephalic.

A study on two ethnic groups Idoma and Igede on Nigerian 425 people in 2015 show that the dominant shape of skull ethnic group, Idoma and Igede was Mesocephalic and also the dominant index for face was hyper euriprosopic.

A study conducting in 2009 on 800 people Ogonis in Nigeria included 400 women and 400 men aged of 25-45 years has showed that indicative skull of this group is brachycephalic.

An anthropometric study which was done in 2016 in north central Nigeria between two ethnic groups, Tiv and Idoma, research sample included 828 volunteers aged 18-32 years and showed that the most common cephalic

index in both groups were brachycephalic with a frequency of 47.7% and 41.7% and dolichocephalic with a minimum rate of 2.9% and 0.7%, respectively.

Cranio-facial anthropometric survey in 2014 among school children as part of Envigado, Colombia was done with a mean age of 8-15 years, 313 people, including 172 women and 141 men. The facial index obtained here was euryprosopic (≤80.9%), mesoprosopic (≥93.1%), and leptoprosopic (% 81-93%), respectively. The most common type of skull was mesocephalic

The human gender and racial differences are not a single and permanent phenomenon. This means that the same differences between different races and ethnic diversity can be seen in it. According to the findings in Tables 1 and 2 and comparing with studies on different ethnic groups in India and Colombia and Nigeria, it can be concluded most of the skull and facial index are mesoprosopic and mesocephalic, respectively.

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Comparing General Health in Pregnant Women with Gestational Diabetes and Healthy Pregnant Women

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Abstract

The objective of the current study was to compare general health in pregnant women with gestational diabetes and healthy pregnant women. The method of this study was descriptive following a casual-comparative design. The sample population included 9666 pregnant women referred to healthcare centers in Zahedan in 2016. The method of sampling was multistage cluster sampling, such that among all healthcare centers in Zahedan, 5 healthcare centers were randomly selected. Afterwards using the convenience sampling method the research questionnaires were distributed among 50 pregnant women with a history of gestational diabetes and 50 healthy pregnant women without such a history. To collect data Goldberg and Hillier General Health Questionnaire (1979) was used. The results of multivariate analysis of variance (MANOVA) indicated that somatic symptoms, anxiety symptoms/sleep disorders, and depression symptoms were more prevalent among women with gestational diabetes than healthy pregnant women ($P \leq 0.05$). However considering social dysfunction symptoms no significant difference was found between these two groups of pregnant women with and without gestational diabetes ($P \geq 0.05$).

Keywords: General Health, Pregnant Women, Gestational Diabetes.

Introduction and Statement of Problem

Diabetes is a common disease in Iran and around the world which progress to chronic state, costly, and creates several complications. For individuals with diabetes, it is difficult to accept these trends which may change their lifestyle (1). Diabetics in pregnant women are two major groups: diabetics who had type 1 diabetes and 2 before pregnancy and the second group gestational diabetes which are firstly diagnosed during pregnancy. In 50% - 30% gestational diabetes are type 2 diabetes and in some cases the process is similar to type 1 diabetes (2). Gestational

diabetes refers to the glucose intolerance with variable intensity. Diabetes refers to high blood glucose levels during pregnancy and

symptoms of diabetes appears in pregnant women who had not been previously diagnosed to have diabetes (3). Women who have diabetes during pregnancy may have children are suffering from obesity and glucose intolerance and diabetes (4). Diabetes in pregnancy is of great attention due to fetal complications such as macrosomia, fetal abnormalities, birth injuries, premature birth, and fetal death due to unspecified problems after birth (5). In addition to fetal problems mentioned, several complications threaten mother's health in pregnancy. The most common complications of diabetes are including nephropathy, retinopathy, neuropathy, hypertension, and infections (6). Due to complications of diabetes in pregnancy and childbirth and especially on the general health of mothers the main question is: is there a significant difference in the general health of pregnant women with gestational diabetes and healthy pregnant women in Zahedan?

Materials and methods

The method of this study was descriptive following a casual-comparative design. The statistical population included 9666 pregnant women referred to healthcare centers in Zahedan in 2016. Since the sample size in causal-comparative studies in each group, 30 patients were suggested for each group (7) i.e. in both healthy pregnant women and pregnant women with gestational diabetes were given 50 questionnaires for more accuracy.

Data collection tool

In order to collect information, Gold- berg & Hillier mental health questionnaire (GHQ) (1979) was used.

Goldberg and Hiller Mental Health Questionnaire (1979)

General Health Questionnaire – 28 *(GHQ-*28*)* was introduced by Goldberg & Hillier. This questionnaire has four sub-scales and every scale has 7 questions including: 1. physical symptoms, 2- anxiety symptoms and sleep disturbances 3- signs of social functioning, 4 - depression symptoms that are designed in multiple choices form. Low degree implies health and high degree represents lack of health or discomfort in individuals and Likert scale (0, 1, 2, 3) was used for scoring. The reliability of General Health Questionnaire – 28 *(GHQ-*28*)* has been reported by Palahang, Nasr, and Brahanie and Shah Mohammad Nasr (1996). In this study, reliability of this test was computed by Cronbach's alpha / retest method 0/82 and 0/86 respectively.

Research findings:

Descriptive findings

Table 1: frequency and percentage of subjects by gender

Gender	Frequency	Percent
female	100	100

total	100	100

As can be seen in Table 1, the number of female subjects was 100.

Table 2: Frequency and percentage of subjects by age

Age	Frequency	Percent
20-25	50	50
26-30	25	25
31-35	25	25
Total	100	100

As can be seen in Table 2 50% of subjects were aged 20 to 25 years 25 % of subjects aged 26 to 30 years and 25% of subjects had an average age of 31 to 35.

The main research question: Are there significant differences in the general health of pregnant women with gestational diabetes and healthy pregnant women in Zahedan?

In order to answer the central question of this study, multivariate analysis of variance (MANOVA) was used and the results are presented in the following tables.

Table 3: Lambdavikez statistical indicators of the general health subscales in two groups of pregnant women with gestational diabetes and healthy pregnant women

Lambdavikez	F	Significance level	Eta root	test ability
0/850	5/474	0/00	0/21	0/864

As can be seen in Table 3, there are significant differences in the general health of pregnant women with gestational diabetes and healthy pregnant women in Zahedan (P =0/00, Wilks Lambda=0/850, F= 5/474) and test ability (0/864) reflects the adequacy of the sample size.

Table 4: Results of multivariate analysis of variance (MANOVA) of general health of two groups of pregnant women with gestational diabetes and healthy pregnant women

Variable	Pregnant women with gestational diabetes		Healthy pregnant women		Mean square	Degree of freedom	Sum of squares	F	Significance level
Physical symptoms	18/13	2/64	12/05	1/70	312/05	1	312/05	6/597	0/02
Symptoms of anxiety and sleep disorders	19/72	1/11	10/40	0/61	183/01	1	183/01	10/889	0/05
Symptoms of social functioning	15/37	2/49	13/95	1/45	6/612	1	6/612	0/264	0/11
Symptoms of Depression	18/17	1/03	13/13	0/33	3/354	1	3/353	0/346	0.04

As can be seen in Table 4, the results of multivariate analysis of variance show that there are significant difference between the mean of somatic symptoms, anxiety / sleep disorders and depressive symptoms between two groups of pregnant women with gestational diabetes and healthy pregnant women (P ≤ 05 /0) thus based on the results between the two groups, we can infer that the mean of three subscales in women with gestational diabetes is more prevalent than healthy pregnant women. However there is no significant difference in social functioning subscale of symptoms between two groups of pregnant women with gestational diabetes and healthy pregnant women (P ≥ 05 /0).

Discussion and conclusion

Pregnancy is the most sensitive and important time of woman's life. Days of pregnancy are very different from other days. Every woman will experience pregnancy and tolerate these hard days in hopes of motherhood. But what is important is that the physical and mental health must be observed during this period (8). Pregnancy periods are accompanied by physical and emotional stress which leads to much physiological and psychological changes (9). These changes are more severe in early pregnancy because hormonal changes in pregnant women leads to changes about perspective of life, skills, and life-style (10). During pregnancy hormonal changes will be affected by their mental condition and can affect a woman's general health (11). Finally it can be stated that pregnancy is a period of vulnerability for women and mothers are faced with new problems and difficulties which may cause impaired mental health and the quality of life (12). In a study by Zarepour and Sadeghie and Bazvand (13) on mental health and its related factors in 250 pregnant women referred to health centers in Kuhdasht in 2009 reported that 31/6 % of pregnant women with a mean age of 26/4 ± 6/1 years were suspected to have mental disorders. Based on the results prevalence of mental disorders in the first, second, and third quarters of pregnancy was 34/4, 23/1, and 40/2, respectively. Mental disorders during pregnancy with some personal characteristics and socio-economic factors were significantly correlated. In a study by Larijani, Azizi and Hosseinnejad (14) on the prevalence of gestational diabetes mellitus in young women reported that among 1209 women under 25 years (mean age of 20/97± 2/1 years), 27 patients (2/23) were diagnosed with gestational diabetes with the average age of the 21/11± 1/85/ years. Of these patients 14/8% was fat, 22/2% had a family history of diabetes, 3.7% with a history of high blood pressure, and 11.11% were suffering from glycosuria. Of the 27 patients with gestational diabetes, 16 patients (59/25%) did not have any of well-known risk factor.

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Ameliorating Effect of Encapsulated Umbilical Cord Stem Cells-Derived Hepatocyte like Cells in High Mannuronic Alginate Microbeads on Acute Liver Failure in Rats

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Summary:

In the present study, umbilical cord-derived stem cells (UCSCs) were encapsulated in high mannuronic alginate beads. Afterward the *UCSCs* differentiated into hepatocyte-like cells for treatment of CCl_4-induced acute liver failure (ALF) in rats**.** Thirty rats were randomly divided into five groups: control group received normal saline, intoxicated group received only CCl_4 to induce ALF. In other groups including cell-free, UCSCs and HLCs alginate beads were transplanted into the liver four days after CCl_4 injection, respectively. After fourteen days the rats were sacrificed and biochemical markers including albumin (ALB), blood urea nitrogen (BUN), alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP) were evaluated. Histological changes and gene expression of ALB, alpha-fetoprotein (AFP) and cytokeratin 18 (CK-18) were also assessed. CK-18 gene expression was significantly increased in HLCs compared to the UCSCs *in vitro*. This finding indicated that UCSCs effectively differentiated into HLCs. In CCl_4-intoxicated group, BUN, AST, ALT and ALP levels, and histological criteria were significantly increased. In this group, ALB secretion was significantly decreased while AFP expression was significantly increased. Both UCSCs and HLCs encapsulated in alginate beads effectively attenuated biochemical tests, improved histological changes, increased expression of ALB and reduced AFP expression. Findings of the present study indicate that encapsulation of UCSCs or HLCs on alginate mannuronic beads effectively improve CCl_4-induced acute liver failure (ALF).

34

35   **Key words:** Umbilical cord, mesenchymal stem cells, microencapsulation, hepatocyte like cells, mannuronic

36   alginate.

37

38   **1 Introduction**

39

40   Acute liver failure (ALF) is a rare but sudden clinical syndrome with high rate of mortality which arises from a fast and

41   extensive hepatocellular necrosis [1]. Liver transplantation is the only choice for treatment of ALF. However, scarcity of

42   human donors has strongly limited the transplantation of the liver [2]. Currently, regenerative medicine has opened a

43   window for treatment of the end-stage hepatic diseases [3]. Tissue engineering has been introduced by using living cells

44   on a suitable substrate or scaffold to restore, maintain, or enhance tissue and organ function [4].

45   Mesenchymal stem cells (MSCs) are attractive sources for cell therapy. They can be easily isolated from various

46   tissues including bone marrow, adipose tissue and umbilical cord [5]. Umbilical cord mesenchymal stem cells (UCSCs)

47   have unique immunosuppressive properties enabling them to evade host rejection [6].

48   A three-dimensional biocompatible scaffold provide a supporting framework for cell growth, cell-cell or cell-matrix

49   interactions, cell adhesion and cell differentiation [7]. Alginate has been considered as a suitable scaffold that plays a

50   critical role in tissue engineering and enhances the function of mature hepatocytes and maintains mature hepatocyte

51   function within bio-artificial livers [8]. Alginate is an unbranched natural copolymer composed of D-mannuronate and

52   L-guluronate, linked together by 1, 4 bonds. Due to its relative stability, biocompatibility, adjustable porosity and

53   simplicity of use, alginate is thus a biomaterial of choice to cell therapy [9].

54   Khalil *et al*. (2001) demonstrated that high mannuronic alginate effectively enhanced ALB secretion in encapsulated

55   hepatocytes in compare to the high guluronic content encapsulation [10].

56   Until now, the ideal marker to trace the pathway of stem cell development does not exist, but under all

57   circumstances, AFP is a very promising candidate for the study of differentiation or retrodifferentiation by virtue of its

58   strong correlation with fetal gene expression. In addition, AFP is a biological marker which increases in liver injuries

59   [11].

60   The expression of albumin (ALB), which is the abundant protein synthesized by mature hepatocytes, starts in early

61   fetal hepatocytes and reaches the maximal level in adult hepatocytes. Cytokeratin 18 (CK-18), a cytoskeletal protein, is

62   expressed in mature hepatocytes. Hence, expression level of these genes can clarify the statue of liver function [8].

63   Most of the transplantation sites, such as intraperitoneal or subcutaneous, are unable to maintain cell viability for

64   long time periods as the transplanted cells have poor access to oxygen and nutrients [12]. The present study was

65   conducted to investigate whether the transplantation of mannuronic-rich alginate beads encapsulated UCSCs-derived

66   hepatocyte like cells (HLCs) into the liver could ameliorate ALF induced by carbon tetrachloride (CCl_4) in rats.

67

68   **2 Material and methods**

69 The study protocol was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences

70 (AJUMS) and all procedures were performed according to the ethics committee approval (Ethical code:

71 IR.AJUMS.REC1394.605).

72

73 **2.1 Isolation of UCSCs**

74 Fresh human umbilical cords were collected aseptically from the mothers undergoing uncomplicated elective cesarean

75 section after receiving their written consent. The umbilical cords dissected to earn small pieces of Wartons' jelly. The

76 Wartons' jelly pieces were cultured as explants in DMEM (low glucose) with 20% fetal bovine serum.

77 The explants were left undisturbed for 3 days in CO_2 incubator at 37°C. After 10 days, the explants were removed from

78 flasks. After 5 days, the flasks were passaged and the isolated cells were used to the experiment [13]. The isolated cells

79 were also characterized using flow cytometry and assessment of differentiation potential.

80

81 **2.2 Encapsulation of UCSCs and hepatic differentiation**

82 A low viscosity, high mannuronic acid alginate solution (2% wt/vol, Nova Matrix, Philadelphia, PA) was used in this

83 study. Briefly the alginate powder was dissolved in buffer solution containing 0.15 M NaCl and 0.025 M HEPES [14].

84 The isolated UCSCs at a density of 1×10^6 cells/mL were resuspended in 3 mL of the above solution and dropped into a

85 102 mM $CaCl_2$ solution and allowed to be polymerized for 20 min. Then, alginate beads containing UCSCs were rinsed

86 3 times in 0.15 M NaCl. The constructs were finally cultured in 25-cm^2 T-flasks. Differentiation of UCSCs into HLCs

87 was induced by using a 4-step protocol as follows [15]:

88   Step I: DMEM (low glucose) and 10 ng/ml fibroblast growth factor (FGF-4) for 2 days.

89   Step II: DMEM (low glucose), 1% insulin-transferrin-selenium (ITS) and 20 ng/ml hepatocyte growth factor (HGF)

90 for 2 days.

91   Step III: Williams' Emedium, 100 nM dexamethasone, 1% ITS, 10^{-7} Mg glucagon and 10 ng/ml oncostatin M

92 (OSM) for 2 days.

93   Step IV: Step III medium and 100 nM TSA or 1% dimethyl sulfoxide (DMSO) for 14 days. The medium was

94 exchanged every 2 days [15].

95

96 **2.3 Scanning electron microscopy**

97 The alginate free-cell beads, UCSCs beads and HLCs beads were assessed by a scanning electron microscope before

98 transplantation. Briefly, the beads were washed twice with cold phosphate buffered saline (PBS) and fixed by 2.5%

99 glutaraldehyde for 24 hours. The beads were fixed with 2.5% glutaraldehyde buffered in 0.15 mol/L sodium cacodylate

100 at 20°C for one hour (pH=7.2). After fixation, the beads were repeatedly rinsed in cacodylate buffer. The cultures were

101 then dehydrated in a graded series of ethanol (50, 70, 95 and 100% alcohol). The preparations were sputter-coated with

102 gold-palladium before SEM [16].

103

104 **2.4 Animals**

105 Thirty rats (Albino, male, 250 to 300 g) were obtained from Experimental Animals Research Center of Ahvaz
106 Jundishapur University of Medical Sciences and housed for 1 week in the animal room of the Department of Anatomical
107 Sciences for adaptation to the environmental before the experiments. The experimental room had a controlled
108 temperature at $20 \pm 5°C$ with 12 hours light/dark cycles. The animals had access to food and water freely. The study
109 protocol was approved by the Ethics Committee of Ahvaz Jundishapour University of Medical Sciences (approved
110 number: IR. Ajums. REC. 1394. 605).

111

112 **2.5 Liver surgery**

113 All surgeries were performed under deep anesthesia and sterile surgical techniques. The animals were anesthetized with
114 10% ketamine and 2% xylazine (Alfasan, Woerden, Netherlands) through intraperitoneal injection and then fixed in
115 supine position. The surgical area was disinfected with iodophore. A midline abdominal incision (2 to 3 cm) was made
116 and alginate beads were placed into the liver between the lobes. Then, the abdominal incision was sutured in two layers
117 with 5-0 absorbable suture. Each rat was maintained in a separate cage and checked daily for their health statue.

118

119 **2.6 Experimental design**

120 The rats were randomly divided into 5 groups:

121 1- Negative control group: received normal saline via intrapritoneal injection.

122 2- CCl_4-intoxicated group: received only CCl_4 via intrapritoneal injection.

123 3-Cell-free alginate transplanted group: cell-free beads were transplanted into the liver 4 days after administration of
124 CCl_4.

125 4-UCSCs transplanted group: UCSCs alginate beads equivalent to one million were transplanted into the liver 4 days
126 after administration of CCl_4.

127 5- HLCs alginate beads transplanted group: HLCs alginate beads equivalent to one million cells were transplanted
128 into the liver 4 days after administration of CCl_4.

129 To induce ALF, CCl_4 at the dose of 400 μL/kg was peritonealy injected for two consecutive days. CCl_4 was
130 dissolved in olive oil (1:1) [17].

131 Fourteen days after transplantation, the rats were euthanized, their liver tissues were removed and fixed in 10%
132 neutral formalin solution for histological assessments [18].

133

134 **2.7 Biochemical tests**

135 Blood samples were collected and centrifuged for 15 min at 10,000 g. The supernatant was stored at -80°C until use.
136 Albumin (ALB), blood urea nitrogen (BUN), alanine aminotransferase (ALT), aspartate aminotransferase (AST) and
137 alkaline phosphatase (ALP) were determined using photometric kits (Pars Azmun, Tehran, Iran) according to the
138 manufacturer's instruction.

139

140 **2.8 Histological evaluation**

141 After blood collection, the rat livers were fixed in 10% formalin. Paraffin sections of 4-6 µm were prepared and stained

142 with hematoxylin and eosin (H&E). Six microscopy slides per animal were examined for assessment of histological

143 changes such as congestion of erythrocytes (RBC), infiltration of inflammatory cells, nuclear pyknosis and sinusoidal

144 dilation. For assessment of nuclear pyknosis, the average percentage of nuclear pyknosis was determined by dividing the

145 number nuclei with the pyknosis in a randomly microscopic field by the total number of nuclei in the same field and the

146 result multiplied by 100. Infiltration of inflammatory cells, sinusoidal dilation and congestion of RBCs were graded into

147 4 categories: normal (0), weak (1), moderate (2) or intense (3) and the averages were considered. For each slide the

148 mean of 6 fields was calculated. Slides were read in a "blind" fashion [19].

149

150 **2.9 Real-time RT-PCR analysis**

151 Real-time RT-PCR was performed to determine the mRNA expression levels of ALB, AFP and CK-18. The RNA was

152 isolated from the liver tissue by using the RNeasy plus Mini Kit (Qiagen, Gaithersburg, MD, USA) according to the

153 manufacturer's instructions. The extracted RNAs were quantified using a nanodrop spectrophotometer (Thermo

154 Scientific NanoDrop 2000c Spectrophotometer, USA).

155 The cDNA was synthesized using a QuantiTect Reverse Transcription Kit (Qiagen, Gaithersburg, MD, USA).

156 The primer sequences used in this study were ALB: 5-GCCTGCTGACTTGCCTTCATTAG-3 (forward primer) and 5

157 TCAGCAGCAGCACGACAGAGTA-3 (reverse primer);

158 AFP: 5-GAAACCCACTGGAGATGAACAGTC-3 (forward primer) and 5-AAGTGGGATCGATGCAGGA-3 (reverse

159 primer);

160 CK-18: 5-GATCGACCTGGACTCCATGAGAA-3 (forward primer) and 5-CCGTTGAGCTGCTCCATCTGTA-3

161 (reverse primer);

162 GAPDH: were TGCTGGTGCTGAGTATGTCGTG (forward primer) and CGGAGATGATGACCCTTTTGG (reverse

163 primer).

164 PCR amplification was done over 40 cycles using the following program: 95˚C for 10 minutes, 95˚C for 15 seconds,

165 5˚C for 45 seconds and 60˚C for 40 seconds. The data were analyzed using the $2^{-\Delta\Delta CT}$ method. Expression values were

166 corrected for the housekeeping genes glyceraldehyde-3-phosphate dehydrogenase *(Gapdh)* [20].

167

168 **2.10 Statistical analysis**

169 Data were presented as mean ± standard deviation and were statistically analyzed using SPSS software (Version 22,

170 Chicago, Illinois, USA) by one-way analysis of variance (ANOVA). The difference between the means was considered

171 significant when *p* was < 0.05.

172

173 **3 Results**

174

175 **3.1 Morphology assessments**

176   UCSCs had fibroblast like shape. HLCs were close together and formed cell clusters. The cell clusters had clear
177   cytoplasm and nuclei with polyhedral morphology.

178   In the SEM staining the cell-free spongy beads had numerous interconnected pores. The beads had porosity with
179   mean pore size of 176.88. The UCSCs formed continuous sheets of cells and filled the interconnected pores of the
180   alginate beads. The morphology of encapsulated UCSCs was flat and elongate. While, the encapsulated HLCs showed
181   polyhedral morphology with confluence similar to the hepatic-like clusters (Figure 1).

182

183   **3.2 Biochemical tests**
184   In the CCl_4 intoxicated group, AST, ALT, ALP and BUN levels were significantly increased. ALB concentration was
185   significantly decreased in this group ($p < 0.05$). In transplantation of cell-free beads, the biochemical markers were not
186   significantly changed in compare to the CCl_4-intoxicated rats. In UCSCs transplantation group, ALB level was
187   significantly increased while other biochemical markers were significantly decreased in compare to the CCl_4-intoxicated
188   group ($p < 0.05$). In HLCs transplantation group, ALB concentration was significantly increased, and other biochemical
189   tests were significantly decreased in comparison to the CCl_4-intoxicated group ($p < 0.05$). ALB level in HLCs
190   transplantation was significantly increased in comparison to the UCSCs transplanted rats ($p < 0.05$). There was no
191   significant alteration in other biochemical tests between UCSCs and HLCs transplanted groups (Figures 2 and 3).

192   **3.3 Histology**
193   Normal liver architecture was observed in control group. Lobular structure of the liver was damaged in CCl_4-intoxicated
194   rats. Accumulation of erythrocytes, infiltration of inflammatory cells, nuclear pyknosis and sinusoidal dilation were
195   observed in this group. In the cell-free beads transplantation, histological criteria were not changed in comparison to the
196   CCl_4-intoxicated rats. The histological criteria were significantly decreased in both UCSCs and HLCs transplanted
197   animals in comparison to the CCL_4-treated rats. There was no significant changes in histological criteria between the
198   UCSCs and HLCs transplanted rats (Figure 4 and Table 1).

199

200   **3.4 Gene expression**
201   In the cell-free beads transplanted group, expression of ALB, AFP and CK-18 genes was similar to the CCl_4-treated
202   animals. In UCSCs transplantation, expression of ALB and CK-18 genes were significantly increased while AFP
203   expression was significantly decreased in compare to the CCl_4-intoxicated rats. In the HLCs transplantation, ALB and
204   CK-18 expression levels were significantly increased while AFP expression was significantly decreased in compare to
205   the only CCl_4-treated rats. There was no significant differentiation in expression of AFP between UCSCs and HLCs
206   transplanted groups Expression of ALB and CK-18 genes in HLCs transplantation group was significantly increased in
207   compare to the UCSCs-transplanted animals (Figure 5).

208

209   **4 Discussion**

210

211 This study have demonstrated that alginate encapsulation effectively enhances differentiation of UCSCs into the HLCs.
212 Hu et al. (2015) have reported that somatic stem cells encapsulated in alginate micro beads were successfully
213 differentiated into the HLCs and secret ALB [21].

214   The HLCs encapsulated in alginate beads attenuated ALF induced by CCl_4 when transplanted into the liver of rats. In
215 a previous study, injection of UCSCs-derived HLCs effectively improved CCl_4-induced liver damages in mice [22].
216 Transplantation of the encapsulated hepatocytes in alginate/Poly-L-lysine improved the hepatic function in a 90% partial
217 hepatectomy of rats [12].

218   In this study, ALT, AST and ALP levels which are important indicators of liver injury were markedly decreased in
219 HLCs transplanted rats. The serum activity of these enzymes is routinely measured for detection of the liver disorders
220 [19]. The liver cells release these enzymes into the blood stream following injury or cell death. Hence, reversal of these
221 biomarkers by HLCs indicates that these transplanted cells may decrease liver cell death.

222   AFP significantly decreased in HLCs transplanted rats. In addition, ALB secretion was significantly increased after
223 transplantation of these cells. These data indicate that HLCs have similar function to hepatocytes and confirm hepato-
224 protective effects of these cells.

225   The results of the histological study also supported the results of biochemical parameters. Transplantation of HLCs
226 effectively attenuated histological changes such as nuclear pyknosis, sinusoidal dilation, congestion of RBCs, and
227 infiltration of inflammatory cells compared to the rats treated with CCl_4 alone.

228   The alterations in ALB secretion, AFP gene expression and biochemical tests were accompanied by improvement of
229 histological criteria in HCLs transplantation. Transplantation of hepatic-differentiated human amniotic epithelial cells in
230 a mice model of cirrhosis led to a successful *in vivo* engraftment and differentiation into functional hepatocytes [23].

231   Interestingly, in present study, encapsulated UCSCs also attenuated ALF when transplanted into the liver. Li et al.
232 (2014) showed that 3-Hydroxybutyrate, 3-hydroxyvalerate and 3-hydroxyhexanoate scaffolds loaded with UCSCs
233 improved liver damages [7]. Li et al. (2012) showed that intraportal transplantation of human bone marrow MSCs
234 prevented hepatocellular degeneration induced by D-galactosamine in pigs [24]. Aldridge et al. (2012) demonstrated that
235 fluorescently labeled MSCs accumulated in liver and alleviated CCl_4-induced liver damage in mice [25].

236   In UCSCs transplanted group, no significant changes in biochemical tests and ALB secretion in compare to the
237 HLCs transplanted animals were observed. In agreement with our findings, Zhou et al. (2014) have demonstrated that
238 UCSCs and UCSCs-derived hepatocytes have similar hepato-protective effect in an ALF mice model [26].

239   Ramanathan et al. (2015) showed that human induced pluripotent stem cells differentiated into the HLCs after
240 transplantation in ALF-induced by D-galactose in rats. The transplanted cells attenuated ALT, AST and BUN levels in
241 D-galactose-treated rats. The transplanted cells also markedly increased ALB secretion in D-galactose-treated rats [27].
242 In the study of Elmahdy et al. (2017), injection of UCSCs improved liver failure, and decreased ALT and AST levels in
243 CCl_4-treated mice [28].

244   In the present study, UCSCs encapsulated alginate beads expressed hepatocyte-specific markers (CK-18 and ALB)
245 after two weeks of transplantation in CCl_4-treated rats. However, we could not clearly prove that the transplanted
246 UCSCs fully differentiated into cells with functions comparable to endogenous hepatocytes and rescue the ALF animals.

247 Deng et al. (2014) have demonstrated that direct transplantation of adipose stem cells (via the tail vein injection)
248 effectively improve treatment for ALF induced by CCl_4 in mice [29].

249 As shown in results, transplantation of UCSCs markedly increased ALB secretion. This finding indicates that the
250 UCSCs may differentiate into the HLCs in liver niche. It is possible that stimulating factors which secreted from
251 damaged liver tissue affect UCSCs and induce differentiation of these cells into the HLCs. It has been revealed that
252 extracellular matrix plays a critical role in hepatocyte differentiation [30].

253 Maeno et al. (2005) have reported that 12-48 hours after hepatectomy, vascular-endothelial growth factor (VEGF)
254 and the fibroblast-growth factor (FGF) are activated in liver tissue [31].

255 Tissue injury response regulators such as complement system, platelets, inflammatory cytokines, growth factors and
256 anti-inflammatory factors were activated after liver damage [30]. Growth factors including HGF, TGF-α and EGF
257 promote hepatic survival by stimulating liver regeneration and providing hepaprotection in various models of liver
258 injury such as ALF-induced by CCl_4 [32]. HGF administration to rodents was confirmed to reduce the level of CCl_4-
259 induced injury [33]. Hence, it is possible that transplanted UCSCs obtained HGF and EGF from injured liver tissue and
260 differentiate into HLCs in response to these growth factors. Interestingly, we have also used HGF and EGF for
261 differentiation of UCSCs into the HLCs *in vitro*.

262 In addition, expression of ALB and CK-18 genes was significantly increased in UCSCs transplanted cells. These
263 findings confirm the differentiation of encapsulated UCSCs in hepatic niche.

264 Asgari et al. (2013) showed that HLCs derived from human induced pluripotent stem cells expressed hepatocyte-
265 specific markers and secreted ALB after transplantation in CCl_4-injured mouse liver [34].

266 UCSCs transplantation attenuated histological changes similar to the HCLs. After transplantation of both UCSCs and
267 HLCs, infiltration of inflammatory cells markedly decreased in the liver tissue. Burra et al. (2012) reported that systemic
268 administration of a novel human UCSCs reduced inflammation in CCl_4-induced hepatotoxicity [35]. Chen et al. (2015)
269 showed that MSCs conditioned medium prevented inflammation in radiation-induced liver injury [36]. Tuo et al. (2017)
270 showed that UCSCs inhibited immune response, promoted hepatocyte regeneration, alleviated the progression of liver
271 fibrosis, and improved liver function in CCl_4-induced hepatotoxicity [37]. Anti-inflammatory effects of UCSCs on liver
272 tissue have also reported by Liu et al. (2014) (38).

273 Tumor formation is the most important problem of the cell therapy. Tumorogenicity is a common problem of
274 embryonic stem cells or induced pleuripotent stem cells transplantations. While, tumorogenicity of mesenchymal stem
275 cells is very low [38]. It was previously reported that differentiated MSCs were more stable and safer than
276 undifferentiated MSCs, because of their lineage commitment to hepatocytes [39]. Hence, transplantation of HLCs may
277 be safer than UCSCs.

278 There are many transplantation sites, including omentum, small intestinal mesentery and subcutaneous space of the
279 abdominal wall [40]. In most studies, the intraperitoneal cavity was used as the site of transplantation. However, this site
280 sometimes caused fibrosis around the encapsulated cells (Aoki et al., 2005) [12]. It was found that only a few adipose-
281 derived stem cells migrated to the liver via spleen delivery and most transplanted cells remained in the spleen [41].
282 Hence, in this study the alginate beads were inserted into the liver.

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287   **5 Conclusion**

288

289 This study have demonstrated that transplantation of UCSCs and HLCs alginate beads improve CCl_4-induced ALF by

290 decreasing ALT, AST and ALP levels which are important indicators of liver injury. ALB secretion was also markedly

291 increased after transplantation of UCSCs and HLCs which indicate functional improvement of hepatocytes.

292   However, the mechanisms such as paracrine, anti-inflammatory, and antiapoptotic effects of transplanted UCSCs and

293 HLCs alginate beads remain to be resolved.

294
295

296   **Conflict of interest**

297   The author declare that they have no financial conflict of interest.

298

299 **Author contributions**

300   Varaa N and Azandeh S designed the study; Bijan Nejad D, Bayati V, Bahreini A and Varaa N performed the research;

301 Khorsand LS and Azandeh S analyzed the data; Khorsandi LS wrote and finalized the paper.

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308   **Ethical approval statement**

309 The study protocol was approved by the Ethics Committee of Ahvaz Jundishapour University of Medical Sciences

310 (approved number: IR. Ajums. REC. 1394. 605).

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424   **Table 1** histological criteria in control and experimental groups.

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Histological criteria	Groups				
	Control	CCl$_4$	Cell-free beads	UCSCs beads	HLCs beads
Congestion of RBC	0.0 ± 0.0	$2.5 \pm 0.3^*$	$2.8 \pm 0.12^*$	$0.41 \pm 0.4^{*\#\#}$	$0.35 \pm 0.04^{*\#\#}$
Infiltration of inflammatory cells	0.01 ± 0.001	$1.8 \pm 4.16^*$	$2.1 \pm 4.3^*$	$0.43 \pm 0.05^{*\#\#}$	$0.2 \pm 0.09^{*\#\#}$
Sinusoidal dilatation	0.04 ± 0.002	$2.48 \pm 0.25^*$	$2.53 \pm 0.19^*$	$1.4 \pm 0.05^{*\#}$	$1.35 \pm 0.07^{*\#}$
Pyknosis (%)	0.01 ± 0.002	$36.3 \pm 5.3^*$	38.3 ± 3.8	$13.9 \pm 2.6^{*\#\#}$	$12.3 \pm 2.9^{*\#\#}$

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427 Values are expressed as mean ± SD. *p < 0.001, #p < 0.05, ## p < 0.01; * and # symbols respectively indicate

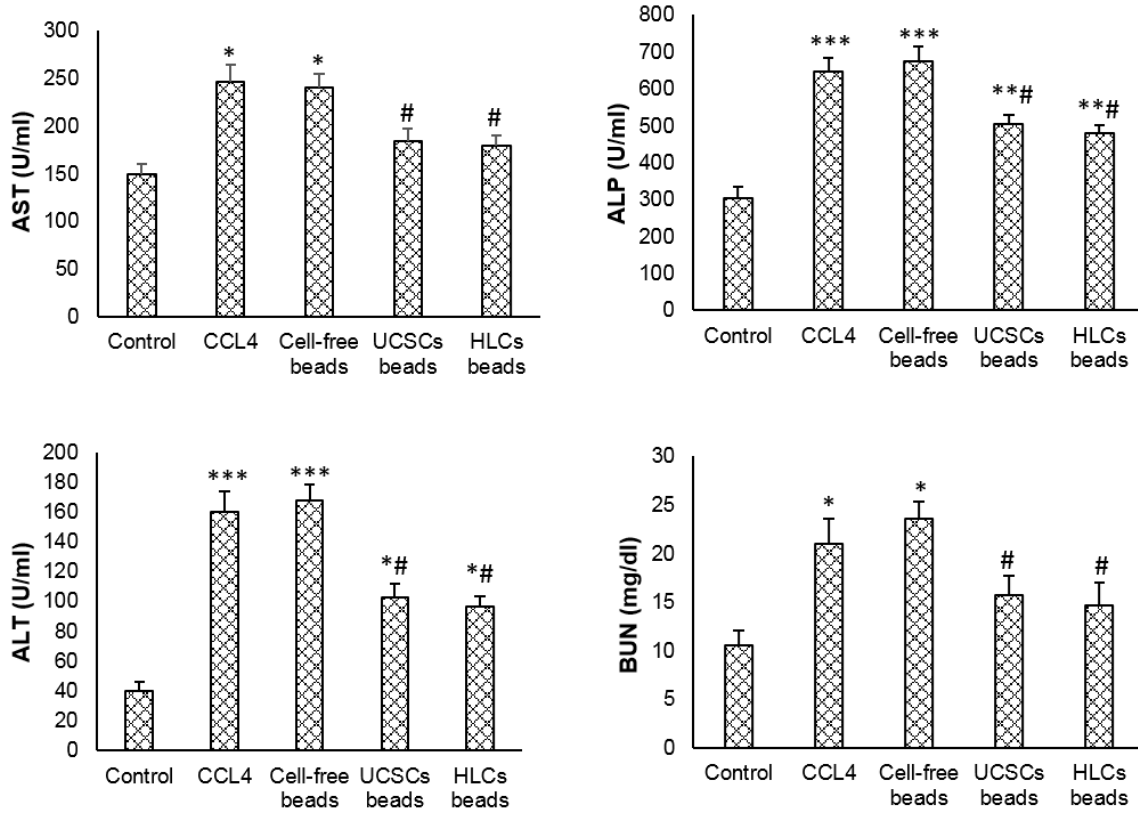428 comparison to the control and CCL$_4$-intoxicated rats groups.

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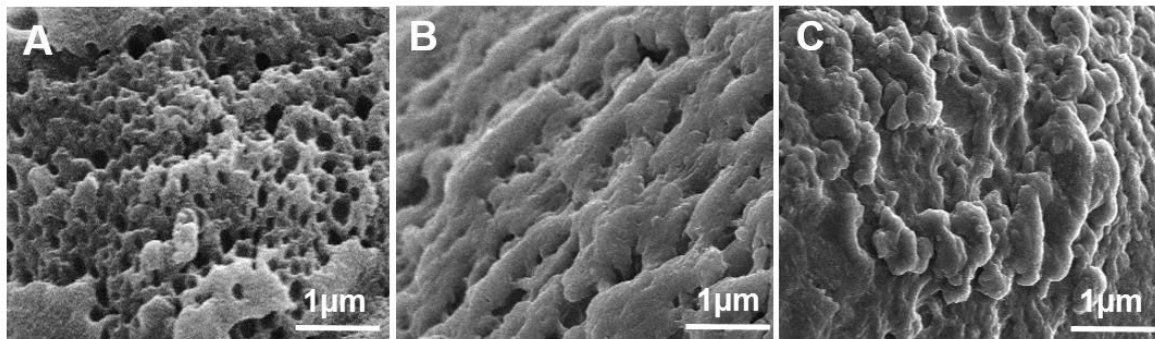
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445 **Figure 1** photomicrograph of SEM staining. A, cell-free alginate bead; B, UCSCs alginate bead; HLCs alginate bead.
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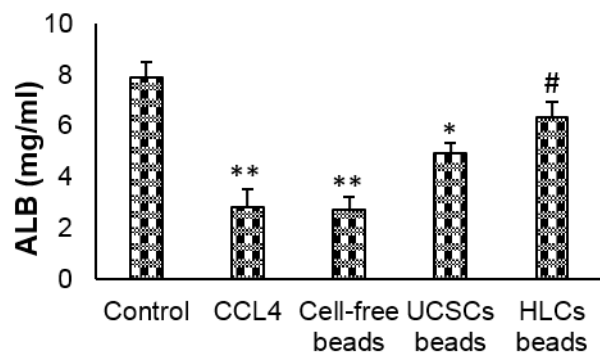447
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Figure 2 Plasma levels of Biochemical markers in control and experimental groups. Values expressed as mean ± SD for 6 rats. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$, # $p < 0.05$; * and # symbols respectively indicate comparison to the control and CCl$_4$-intoxicated groups.

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Figure 3 ALB secretion in control and experimental groups. Values expressed as mean ± SD for 6 rats. *$p < 0.05$, **$p < 0.01$, # $p < 0.05$; * and # symbols respectively indicate comparison to the control and CCl$_4$-intoxicated groups.

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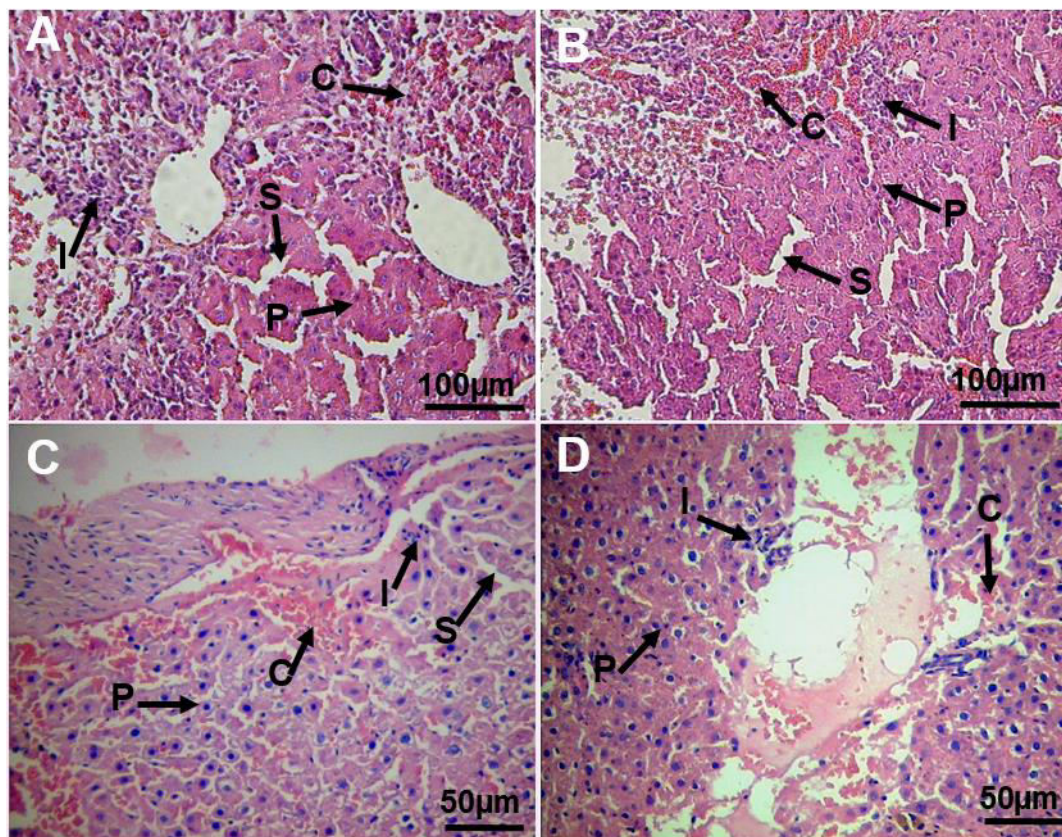
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500 **Figure 4** Light microscopy of cross sections of H&E stained liver tissue. A: CCl$_4$ group; B: cell-free beads transplanted
501 group; C: UCSCs beads transplanted group; D: HLCs beads transplanted group. C: congestion of RBCs, I: infiltration of
502 inflammatory cells, P: nuclear pyknosis, S: sinusoidal dilation:

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506 **Figure 5** Gene expression in various groups. Values expressed as mean ± SD for 6 rats. *$p < 0.05$, **$p < 0.01$, ***$p <$
507 0.001, # $p < 0.05$; * and # symbols respectively indicate comparison to the control and CCl_4-intoxicated groups.
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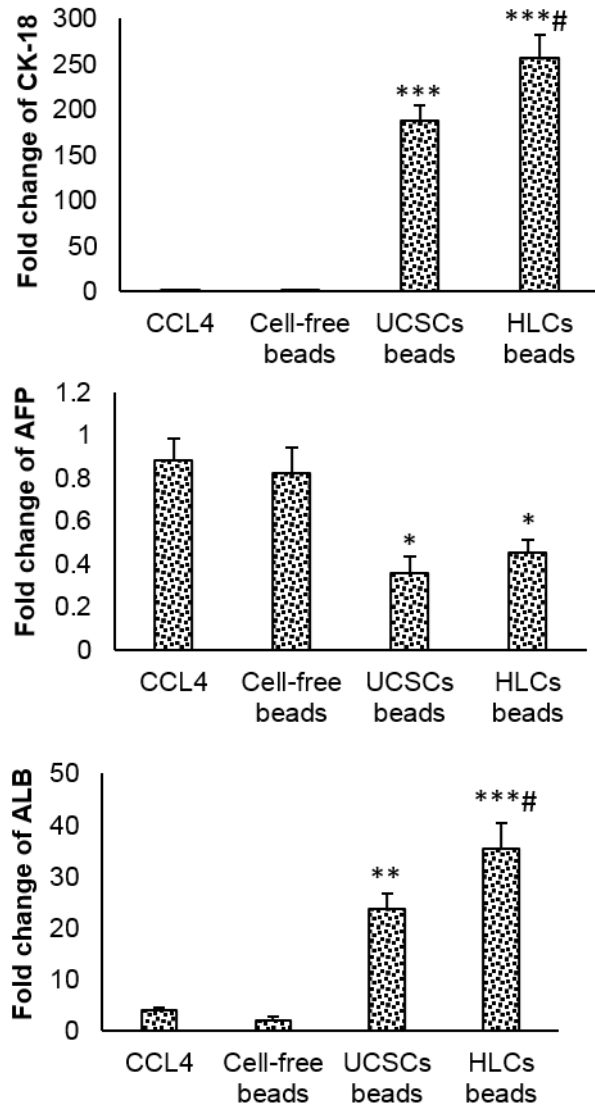510
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The necessity of providing health-promoting lifestyle counseling for middle-aged women referred to health centers in Ahwaz in 2016

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Abstract

Introduction

 Due to the importance of factors related to health-promoting lifestyle such as responsibility in health, interpersonal relationships, management of stress, exercise, and nutrition, this research was conducted to evaluate the necessity of lifestyle consulting for postmenopausal women referred to health centers of 2, 7 and 9 in Ahwaz.

Method: This cross sectional type of descriptive-analytical studypopulation of study included 10 postmenopausal women aged 45-60 years who referred to health centers of 2, 7, and 9 in the Ahwaz city. As there are two west and east health centers in the Ahwaz city and each district has several centers, three centers were randomly selected. Data collection tool included a questionnaire contained two demographic parts developed by researcher and the part related to the health-promoting lifestyle questionnaire of Walker (HPLP). Participants were examined in terms of type of lifestyle (weak and good). Obtaining the score lower than 103 was considered as weak lifestyle. Data were analyzed using SPSS VOL.16 software and Chi-square test at the significance level of 0.05.

Research findings: The findings showed that the women mean and SD age was 54.17± 16.4 years, mean and SD of BMI was 03.01 ± 5.28, and the mean and SD age of menopause women was 64.58±10.19. Comparison of the lifestyle components showed that 19.81 ± 3.02% of postmenopausal women referred to health centers of Ahwaz city had weak lifestyle. Exercise with mean and SD of 11 ± 4.80 and stress management with those of 11.20± 2.98 had the lowest score. The results show that there is a significant correlation between BMI and life style in postmenopausal women.

Discussion and Conclusion: Lifestyle of women participating in the study is relatively weak which it shows the necessity of attention and emphasis on the role of counselling with the aim of familiarizing the women with appropriate lifestyle and correct behavioral habits especially exercise as a preventive factor.

Keywords: health-promoting lifestyle, postmenopausal women, responsibility in health, interpersonal relationships, management of stress, exercise, nutrition

Introduction

Increasing life expectancy in 20th century and stability of menopause age have led to whereby women are increasing (1). The most important thing in the menopausal changes is the (BMD) (2). On the other hand, people entering the stage of menopause experience unhealthy lifestyles (3). In fact lifestyle is related to daily patterns of the person at various dimensions especially nutrition and physical activity (4). Unhealthy lifestyle is one of the important risk factors for disease and mortality. Nearly 80% of all cardiovascular diseases are related to it (5). Due to the short-term and long-term effects of medicines and replacement hormones it is better that non-drug method be used to improve lifestyle (6). Studies in Iran showed that lifestyle is among the risk factors in the high blood pressure and lifestyle-associated diseases are among the causes of mortality and disability (7). More studies in this regard and accurate recognition of relationship between life style and diseases can be effective in the prevention and control of such diseases (8). In the studies conducted by Sabri et al (9), Najar et al (10), Farajzadeh et al (11) they showed that

inappropriate lifestyle of people is effective in the high blood pressure. Premenopausal age is an important period for women and health care providers for counselling and choosing treatment method. Consultation is performed in order to overcome the fear of postmenopausal women, the reduction of symptoms, and improvement of lifestyle. It is necessary that the significance of effects related to the nutritional factors, exercise, and medications to be studied. A comparative study showed that the mean time of general physicians on menopause is 10 minutes while it is 45 minutes with experts. In this study, 80% of the women were dissatisfied on this. Therefore it is not surprising that they look for other place to obtain the correct information (12). Therefore due to inappropriate lifestyle of Iranian women and the importance of paying attention to menopause in the family and community health in reducing mortality and morbidity, decreasing the costs resulting from illnesses and symptoms of menopause, and women's lack of access to most of the country's menopause counseling centers led to this study aimed at investigating lifestyle of mid-aged women and necessity of counselling in the Ahwaz.

Method

This cross-sectional, descriptive-analytical study that examined lifestyle of middle-aged women (postmenopausal) in Ahwaz. Samples of this study included 101 qualified women referred to health centers 2, 7, and 9 by obtaining the permission from authorities. The selection of samples procedure continued till the required number of samples was completed. The characteristics of study subjects included postmenopausal women who have passed their menstrual period for at least 12 months. In addition all of them were residents of Ahwaz city, aged 45-60 years, had reading and writing literacy, and were able to answer the questions. The exclusion criteria of study included non-natural menopause that is cessation of menstruations caused by hysterectomy, radiation therapy, medication, illness, having mental health problems and systemic diseases. The data collection tool consisted of a researcher-made questionnaire part and health-promoting lifestyle part. To determine the validity demographic questionnaire was developed by and reviewed by some faculty members (n=8) of Jundishapur Faculty of Nursing and Midwifery in Ahwaz. Then their views were analyzed and the final form was developed by applying it in the questionnaire. The Lifestyle Questionnaire was presented by Walker et al (13) in united of states and it contained 52 questions in 6 dimensions. The six dimensions included self-actualization, responsibility in health, interpersonal management, stress management, physical activity, and nutrition. Investigating the lifestyle was at three levels of good (score higher than 156), moderate (score between 155-104) and weak (less than 103) based on the score obtained from questionnaire. The criterion for scaling was based on 4-point Likert scale. In each scale, the score of each person was between 1 and 4 interpreted as follows: never=1 (bad), sometimes=2 (weak), most of time=3 (moderate), always=4 (lack of problem). Data were also collected by means interview. The response of the participants to the questions depended on their honesty and this was the limitation of the study. In order to conduct the research qualified subjects of the study were invited bythe health authorities. Then the questionnaire was completed by subjects using interview method after the objective and methodology of the study and obtaining oral consent.

Results

The mean and SD age of the studied women was 54.17± 16.4 years while the mean and SD of BMI was 03.01 ± 5.28. The mean and SD of menopause age was 64.58±10.19. Table 1 shows the frequency distribution of middle-aged women in terms of personal characteristics. This study showed that 26.7% of people who had weak lifestyle had lower educational level. In addition, 21.4% of people who had weak lifestyle had moderate economic status which the necessity of counselling can be realized in the lifestyle change.

Table 1: Results of chi-square test to examine the relationship between demographic characteristics and lifestyle

Lifestyle / demographic characteristics		Good Number (percentage)	Weak Number (percentage)	Total	Chi-square value	Significance level
Education level	Elementary	(8.9) 9	(5.6) 6	(14.9) 15	7.674	0.054
	Guidance	(3) 3	(5.9) 6	(8.9) 9		
	High school	(41.6) 42	(14.9) 15	(56.4) 57		
	Academic	(15.8) 16	(4) 4	(19.8) 20		
Employment status	Employed	(13.9) 14	(6.9) 7	(20.8) 21	0.087	0.768
	Housewife	(55.4) 56	(23.8) 24	(79.2) 80		
Marital status	Single	(2) 2	(3) 3	(5) 5	3.488	0.322
	Married	(59.4) 60	(22.8) 23	(82.2) 83		
	Divorced	(1) 1	(0) 0	1 (1)		
	Widow	(6.9) 7	(5) 5	(11.9) 12		
Economic status	Good	(27.6) 27	(5.1) 5	(32.7) 33	4.454	0.108
	Moderate	(37.8) 37	(21.4) 21	(52.9) 58		
	Weak	(5.1) 5	(3.1) 3	(8.2) 8		

Table 2 shows the correlation between demographic characteristics and lifestyle. Based on the result presented in this study, it can be inferred that age, BMI, monthly income, number of children, menopause age were not significantly correlated with lifestyle.

Table 2: the results of correlation test

Variables	Good		Weak	
	The correlation coefficient (T)	Significance level (p_value)	The correlation coefficient (T)	Significance level (p_value)
lifestyle ---- Age	-0.145	0.230	0.162	0.383
lifestyle ---- BMI	-0.133	0.274	-0.043	0.819
---- Monthly income lifestyle	0.524	0.146	0.904	0.281
---- Number of children lifestyle	-0.178	0.146	0.049	0.805
---- Menopause age lifestyle	-0.149	0.226	0.1080	0.571

Table 3 shows the comparison of the lifestyle components that 19.81 ± 3.02% of postmenopausal women referred to health centers of Ahwaz city had weak level of lifestyle.

Exercise with mean and SD of 11 ± 4.80 and stress management with mean and SD of 11.20 ± 2.98 had the lowest score.Low mean and SD score of stress management (11.20±2.98) indicate the effect of lack of exercise in increased stress.

Table (3): Comparing the research components in two groups

Variable	Good status		Weak status		Significance level (P)
	Mean	SD	Mean	SD	
Spiritual growth and self-actualization	34.82	5.46	28.70	4.74	P<.001
Responsibility for health	40.21	6.57	27.74	5.56	P<.001
Interpersonal relationships	25.62	3.54	19.03	3.33	P<.001
stress management	15.60	5.99	11.20	2.98	P<.001
Exercise	16.24	5.99	11	4.80	P<.001
Nutrition	22.31	3.87	19.26	4.34	P<.001
Total mean	25.80	2.61	19.81	3.02	P<.001

Discussion

Health promotion is the process of empowering an individuals to increase the control of the health-related factors and thereby to increase their health (14). It includes behaviors in which an individual follows proper nutrition, exercise, staying away destructive behavior and drugs, protection against events, timely detection of disease symptoms in the physical dimension, controlling emotions and feelings, thoughts and cope with stress, problems in mental dimension, independence, adaptability, and improving the interpersonal relationships in social dimension (15). The results of this study show that 19.81 ± 3.02% of postmenopausal women referred to health centers of Ahwaz city require counseling. The lowest score was in exercise and stress management which was consistent with the findings of Gho et al (16) in South Korea, Enjezab et al in Yazd (17) Shabani et al in Sari (18) Sehati et al (19), and Ahmadipour et al (20). Physical inactivity is a challenge in all countries and a risk factor for many diseases since it has been proven that physical activity has positive impact on health. Therefore the reasons for physical inactivity in women should be examined, and counselling and educational interventions provided to improve their physical activity. In addition the study conducted by Passanger showed that healthy lifestyle of people and their mental and physical status are correlated in that people with healthy lifestyle have desired physical and mental status (21). In this study there was no significant relationship between age, and health behaviors of postmenopausal women which are consistent with the findings of Yarahmadi (22) and Jorfi et al (23). It seems that other factors such as chronic diseases, sedentary lifestyle, indifference to health behaviors, and illiteracy are involved in this regard. The study showed there was no relationship between body mass index and lifestyle which it was inconsistent with studies conducted by Carr et al (24), Hung et al (25), Mirghaforvand et al (26) and Jorfi et al (23). The reason could be due to selection of subjects in a certain period of age (60-45 years old) and the impact of age on body mass index. In this study, significant relationship was not found between health behaviors and income of subjects and poor lifestyle. The results of our study were inconsistent with the results of Habkonglek et al (27). The above findings can be explained by the fact that 5.1% people had good economic status, 21.4% people had moderate economic status, and 3.1% people had weak economic status in this study which means economic component did not have negative impact on health behaviors of research subjects. The findings of this research should be taken into consideration along with its limitations. Although the study attempted to select postmenopausal women who were fully ready and wanted to accurately complete the questionnaire, the completion of the questionnaire by middle-aged women who were not focused or accurate-minded should be considered. Due to the importance of the subject it is suggested that similar research in other centers with higher sample size but with a similar questionnaire to be conducted to compare

the results and generalize them. Generally results of this study showed the necessity of counselling in postmenopausal women especially in the area of physical activity.

Acknowledgement

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Perception of illness and health related quality of life of patients diagnosed with Systemic Lupus Erythematosus in Iran

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Abstract

Background: Systemic Lupus Erythematosus (SLE) is an autoimmune multi systemic disorder having a major effect on individual's physical, psychological and social health. Considering patient's poor quality of life and the necessity of cognitive evaluations with respect to health outcomes has lead us to develop a study with the aim of evaluating SLE patient's perception of illness and health related quality of life.

Material and Methods: In the present descriptive-correlated study 164 patients diagnosed with SLE were recruited from the North West health centers of Iran by convenience sampling. Patients were interviewed and evaluated by the Illness Perception Questionnaire (IPQ-R) and Health-related Quality of Life Measurement in Systemic Lupus Erythematosus (HRQOL LUPUS). Afterwards the data were analyzed using the Statistical Package for Social Science (SPSS) software.

Results: Perception of illness has a significant direct relationship with quality of life variables. The most efficient variable on quality of life was cause of disease. Additionally there was no association between disease timeline and any of the health related quality of life variables. This finding was the spotlight of the study making it distinct from other studies.

Conclusion: Findings indicate the notable role of Psychological factors and cognitive evaluations and their effect on outcome. Planning educational programs for SLE patients with the aim of cognitive promotion and psychological interventions is recommended for optimizing quality of life.

Keywords: Perception of illness; Health related quality of life; Systemic Lupus Erythematosus.

Introduction

Systemic Lupus Erythematosus(SLE) is an inflammatory multi-system autoimmune disorder producing auto antibodies against different cell components with a ratio of women to men being 9:1 [1].Patients are typically 15–45 years of age [2]. SLE mainly occurs among African-Americans and Asians and the highest rate was been observed among African Caribbean's [3]. In Iran, SLE prevalence is 40 per 100,000 people with a high mortality [4].Regularly diagnose is difficult due to its wide range of symptoms and variable and confusing clinical manifestation. The American College of Rheumatology has defined SLE as the "great imitator" [5]. Lupus is a cyclic disorder consisting of recurrence (symptoms intensified) and silenced (symptoms decreased) periods. Previously SLE was defined as a mortal disorder but surveillance has improved dramatically over the last 60 years [6].Thus we are facing an increased morbidity, decreased mortality and growing population of patients with SLE [7, 8].

Studies reveal lower health related quality of life (HRQOL) in SLE patient's than the general population and even other chronic disorders. Despite physical features SLE has tremendous effects on psychological function, emotional state, wellbeing, general health and social life [9-11]. SLE leads to disabilities in 25-75% of cases. Additionally perception of illness was weak or lower than optimum in 35-50% of patients. Also many patients believe overcoming the disorder is difficult. These findings indicate the high prevalence (94-100%) of unrequited needs regarding physical status, daily living and psychological concerns [12]. Studies on prevalence of psychological disorders in SLE patients have indicated that more than 40% of SLE patients have striking psychological issues specially anxiety and depression [13].Psychological function in turn could have negative effect on quality of life and interrelationships. Therefore by determining effective psychological-social factors we can improve self-care, prevent consequences and promote quality of health. Leventhal and Nerenz developed a self-regulation model (SRM) that aimed to explain adjustment at the point of diagnosis and throughout the illness. This model believes that health behaviors are the result of complex and multi-faceted representations of illness [14].According to SRM a person has a dynamic and active role in perception of illness. Perception of illness consists of five features: *disease manifest, cause, duration, consequences and the effectiveness of controlling* [15]. Although chronic disorders have similar characteristics they differ in type, severity, disabling level, and their effect on psychosocial factors [16].Perception of illness and its relationship with outcome is specified and less research has been accomplished in the field of SLE. These researches have differed SLE from other chronic disorders [16, 17]. All these studies have been accomplished on small sample sizes. Since cognitive evaluation of disease is related to health outcomes and the ultimate objective of perception of chronic illness is appropriately control by the patient and preventing consequences, it is crucial to improve SLE patient's quality of life and help them adapt with the severity and limitations of the disorder. In this case they will understand the condition and essential therapies which will facilitate adopting to suitable self-care strategies for overcoming daily life issues.

Nurses have crucial role in supporting patient's adaptation to chronic disorders. Hence, nurse's acknowledgment will be helpful regarding patient's perception. By considering all above-mentioned arguments, designing a study for assessing patient's perception of illness and health related quality of life and also determining their needs seems essential. In this case we can design suitable educational programs. Therefore, the objective of this study was to assess SLE patient's perception of illness and health related quality of life and their relationship together.

Material and Methods

In this descriptive-correlated study perception of illness and its effect on quality of life of SLE patients was assessed. The study sample were all the men and women diagnosed with SLE referring to the North West health centers of Iran in 2015. Patients in the active phase were recruited from research units and patients in the silence phase were gathered from the related clinics and rheumatology specialist's offices. The study samples were collected by convenience sampling. Inclusion criteria were SLE diagnosed by the measures of the American Rheumatology Association and being at least 18 years old. Exclusion criteria were having history of psychological disorders, hospitalized in mental hospitals, not willing to participate in the study and having other chronic disorders effecting quality of life. Information was gathered by interviewing and reading patient's profiles and also consulting with physicians. Based on the inclusion and exclusion criteria, 200 patients entered the study 36 individuals were dropped from the study therefore, the information of164patients were assessed and analyzed. Permission was obtained from the regional ethical committee (No: 716) and data were kept confidential. Patients were assured that their information would be kept private without giving their names and analyzed in groups. The purpose of the study was explained to them and written informed consent was obtained. The questionnaires were completed precisely by interviewing each patient individually. Because the questionnaires were too long they were completed in two sessions (before and after the visit) for outpatients and two 15 minute sessions for hospitalized patient. Instruments for gathering data were the Illness Perception Questionnaire, Health-related Quality of Life Measurement and also an8 items socio-demographic checklist about patient's age, sex, education, duration of disease, marital status, occupation, residence, and disease stage.

For measuring patient' perception of illness we used the Illness Perception Questionnaire Revised (IPQ-R) designed by Moss-Morrisand colleagues in 2001 by adjusting the "Illness Perception Questionnaire" [18]. This questionnaire consists of 9 features including *identity, cause, timeline chronic/acute or cyclical, consequences, personal and treatment control, emotional representation and disease coherence*. *Identity* is scored as 0 (no) and 1 (yes) and based on the Likert scale the rest of the measures are scored from 1 (strongly disagree) to 5 (strongly agree). Measures with 6 questions were allowed to have 2 missing's and 1 missing for the rest of the questions. High scores for *identity, timeline, consequences and cyclical timeline* indicate negative perception and *personal control, treatment control and disease coherence* are positive perception of disease. According to Moss-Morris and colleagues the alpha Cronbach for the questionnaire was indicated as 0.79-0.89 [16, 17]. In this study after accomplishing a pilot study total alpha Cronbach was measured as 0.797.

For assessing health-related quality of life we used the Health-related Quality of Life Measurement in Systemic Lupus Erythematosus Questionnaire (HRQOL LUPUS) which was designed by McElhone and colleagues in 2007 [19]. This questionnaire consists of 34 questions and 8 different aspects and measures *physical health, emotional health, body image, pain, planning, fatigue, intimate relationships and burden to others* in a duration of 4 weeks. According to the Likert scale, scoring is from 0 to 4. For convenience of analyzing and interpreting the results, the mean raw domain score is transformed to scores ranging from 0 (worst HRQOL) to 100 (best HRQOL). HRQOL LUPUS has been previously assessed in several studies and its Psychometric features have been verified [20, 21]. Based on Hosseini and colleagues study in 2013, the total alpha Cronbach for Iranian patients was 0.94 [22]. The questionnaire's copyright belongs to Lancashire central university of London. After gaining permission from the designer of the instrument and consulting with 5 bilingual experts regarding language and cultural adaptation, the instruments validity was assessed. Also by accomplishing a pilot study, the instruments reliability was confirmed with a 0.948 alpha Cronbach's.

After gathering all the information, data were coded and were analyzed by the Statistical Package for Social Science (SPSS) version 16. Descriptive statistics was used for determining frequency, mean and standard deviation. Also the Pearson correlation and descriptive stepwise regression analysis was used for investigating the relationship between variables.

Results

In this study 10.60% of patients were male and 89.40% were female. Also 31.10% were single and 67.10% were married. Mean age was 35.50% and an average of 7 years had passed since the beginning of their disease.Additionally54.20% of patients had diploma or less, 31.30% of patients were occupied, and 64.60% were in the silence-phase of their disease.

Table 1 shows mean ±SD of SLE patient's perception of illness variables. Highest mean was allocated for *cause of disease* and lowest mean was for *identity*.

Table 1. SLE patient's perception of illness

Variables	mean	SD	minimum	maximum
Identity	7.5	2.9	1	14
Disease timeline	21.1	5.4	6	30
Cyclical disease timeline	15.4	2.6	6	25
Consequences	20.3	5.4	2	30
Personal control	23.1	4.3	2	36
Treatment control	19.4	2.8	9	26
Emotional representation	21.9	5.8	6	30
Disease coherence	13.2	5.5	2	25
Cause of disease	47.2	9.2	28	70

Table 2 shows mean ±SD of SLE patient's quality of life variables. Highest mean was allocated for *planning* and lowest mean was for *burden to others*.

Table 2. SLE patient's HRQOL

Variables	mean	SD	minimum	maximum
Physical Health	59.9	23.4	9.37	100
Emotional Health	50.3	27.07	0	100
Body Image	62.5	27.6	0	100
Pain	52.8	28.7	0	100
Planning	69.3	28.7	0	100
Fatigue	51.9	23.2	0	100
Intimate Relationships	59.6	34.5	0	100
Burden to others	40.3	30.2	0	100

The Pearson correlation test was calculated in order to assess associations between perception of illness variables and HRQOL (Table 3).There was a significant correlation between perception of illness and health-related quality of life. According to table 3, there was a negative association between *identity, consequences, emotional representation*

and *cause of disease* with HRQOL. Also there was a positive association between *personal control, treatment control* and *disease coherence* and HRQOL. However, there was no significant association between *time line* and any of the variables of quality of life. There was only an association between *cyclical timeline* and few of the variables of quality of life. For analyzing data, we used the step wised multi-variable Regression analytical test. The quota of each of the variables of perception of illness in predicting and expressing HRQOL variance were calculated (table 4). The regression results in the fifth step, indicated that the effects of *consequence, cause, personal control, identity* and *coherence* on quality of life were significant (p<0.05). The expressed variance for quality of life for was 40%, with a negative effect for *consequence, cause* and *identity*. However, the effect of *personal control* and *coherence* were positive. According to the standard regression coefficient the most important variables with significant effect on quality of life were *cause of disease* and then *personal control, identity*, and *coherence*, respectively.

Table 3. The correlation between variables of perception of illness and HRQOL in SLE patients

Variable		Physical Health	Pain	Planning	Intimate Relationships	Burden to Others	Emotional Health	Body Image	Fatigue
Identity	Pearson coefficient	-0.435**	-0.484**	-0.395**	-0.336**	-0.229**	-0.427**	-0/427**	0.343**
	p-value	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000
Disease timeline	Pearson coefficient	-0.066	-0.014	0.038	-0.060	0.021	-0.004	-0.004	-0.057
	p-value	0.402	0.858	0.629	0.482	0.790	0.964	0.964	0.472
Consequences	Pearson coefficient	-0.404**	-0.437**	-0.376**	-0.349**	-0.302**	-0.364**	-0.364**	-0.347**
	p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Personal control	Pearson coefficient	0.272**	0.161*	0.234**	0.199*	0.256**	0.247**	0.247**	0.133
	p-value	0.000	0.038	0.003	0.021	0.002	0.002	0.002	0.104
Treatment control	Pearson coefficient	0.270**	0.287**	0.237**	0.232**	0.148	0.229**	0.229**	0.283**
	p-value	0.000	0.000	0.003	0.005	0.058	0.003	0.003	0.000
Coherence	Pearson coefficient	0.290**	0.297**	0.313**	0.313**	0.271*	0.266**	0.266**	0.168*
	p-value	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.032
Cyclical timeline	Pearson coefficient	-0.210**	-0.200*	-0.176*	-0.142	-0.154*	0.067	0.067	-0.160*
	p-value	0.014	0.014	0.037	0.103	0.067	0.435	0.435	0.040
Emotional representation	Pearson coefficient	-0.244**	-0.199*	-0.228**	-0.290*	-0.289**	-0.546**	-0.546**	-0.304**
	p-value	0.002	0.011	0.003	0.001	0.000	0.000	0.000	0.000
Cause of disease	Pearson coefficient	-0.360**	-0.382*	-0.468**	-0.346**	-0.208**	-0.295**	-0.295**	-0.371**
	p-value	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000

*P<0.05   **P<0.01

Table 4. Summary of the step wised regression (fifth step) model of perception of illness on HRQOL in patients diagnosed with SLE

variable	B	Standard error	β	t	p-value	R	R^2
Constant amount	707.1	96.3	-	7.3	0.000		
consequences	-8.2	2.04	-0.28	-4.02	0.000		
Cause of disease	-5.2	1.2	-0.29	-4.3	0.000		
Personal Control	7.7	2.5	0.21	3.08	0.003	0.67	0.4
Identity	-10.07	4.2	-0.17	-2.3	0.01		
coherence	4.09	2.05	0.1	1.9	0.04		

R: multiple correlation between variables, R^2: Square correlation (a proportion of dependent variable variance which is expressed by the assessed variable), B: Regression sleep, β: standard Regression coefficient, t: standard parameter for the significant confounding test of the quota of each variable in predicting dependent variables

Discussion

This study aimed to determine the role and effect of perception of illness and HRQOL in SLE patients. The findings of the present study showed a significant correlation between perception of illness and HRQOL. Patient's perception regarding disease *identity, consequences, control, timeline* and *cause of disease* have significant effect on determining healthy behaviors and quality of life in a wide range of chronic and acute disorders such as Multiple sclerosis, Huntington's disease and Diabetes[23, 24]. The results of the present study are consistent with previous studies regarding positive perception of illness and better outcome also negative perception of illness and negatives outcome [25-29].Studies was inconsistent with the correlation test results showing higher scores for *consequences, identity, emotional representation, cyclic timeline* and *cause of disease* and lower HRQOL. In this circumstance the patient exaggerates the condition, amplifies the negative and emotional responds ,and then reserves this negative perception in his/her active mind [33].In this situation, unrelated behaviors to illness will be activated and suitable management will be interfered. In other words patients will experience lower quality of life. Also patients with stronger personal and treatment control (trust their treatment) and patients who believe their illness is comprehendible (disease coherence) have higher quality of life. These findings are in consistent with the results of other studies [34]. Patients feel effective and efficient which leads them to better controlling. In fact these patients feel their disease is controllable and do not pay attention to its negative emotional effects [35].They logically deal with their situation and have a higher quality of life. In this study the results of the regression analysis were harmonized with the findings of the self-regulation model of Leventhal and colleagues [36, 37].40% of the variance of HRQOL was predicted by the variables of perception of illness. According to the marks of each variable's regression coefficient, we can see that *consequence, cause* and *identity* have negative effect but *personal control* and *coherence* have positive effect. Based on the standard regression coefficient, *cause, consequence, personal control, identity* and *coherence* had significant effects on quality of life, respectively. Here we discuss the effectiveness of each of the variables:

The most important variable having a significant effect on HRQOL was *cause of disease*. In this study most of the patients believed stress was the main reason of their condition. Studies reveal that stress especially daily stress deteriorates symptoms of SLE and eventually leads to reduction of quality of life [38, 39]. In consistent with this study, latest findings show that most SLE patients believe stress has a major role in the commencement and aggression of their disease [40].However in contrast to our study, a study Seawell reported that participants believed genetic features are the main reason for their illness [16].Since stress is a controllable factor, after *cause of disease* the most important variable having a significant effect on HRQOL was *consequences* of disease. Results show that

in comparison to other chronic disorders, SLE patients tend to express higher *identity* and aggressive *consequences* [16].These differences in perception are mainly due to the destructive nature of the disease and patient's thinking of unexpected death [42].Despite other chronic disorders a new medicine has not been introduced for SLE in the last 40 years. Most patients are not monitored sufficiently. Thus in comparison to Seawell's study the participants in this study had a positive perception for *cause of disease* which may be due to small sample size of Seawell's study (41 patients).In the IPQ-R questionnaire, with an adequate sample (n≥85) and by analyzing *cause of disease*s a group variable it can be used for identifying group beliefs such as life style, stress, etc. [18]. Results indicate that stress management, increases individual's ability for decreasing stress,and adjusting to stressful situations [41]. Thus accurate planning using supportive instruments for reducing stress and enhancing SLE patient's quality of life is essential.

In this study, patients were young and approximately 7 years had passed from the commencement of their disease; they were frustrated about the length of their disease and being able to manage the discomfort for several decades. These patients believe their disease has severe consequences and do not have an accurate perception of their illness and are always nervous and anxious about their condition. Since anxiety has a verified role in intensifying SLE symptoms decline of quality of life is not unexpected.

Another consistent finding was the significant direct effect of personal control on patient's quality of life [23, 24]. Patients who have efficient sense of controlling can control their illness more effectively. They can control stressful situations better and underestimate its negative emotional behaviors [35]. Also personal control leads to better understanding of inner and outer resources for overcoming disorders and feeling strong and passionate [43].In general positive perception of illness in companion with control of disease and its symptoms and feelings are precursors of treatment. Better treatment in turn leads to positive perception [44]. It is expected to have better quality of life with positive perception of illness.

Other features of perception of illness which have significant effect on quality of life are *identity* and *coherence of illness*. In this study in parallel to other studies, *identity* had a diverse and *coherence* had direct association with HRQOL [23, 24].According to the chronic multi-systemic manifestation of SLE and the abundant medications with strict consequences, most patients do not have precise perception for SLE or their selves and often have reproductive difficulties therefore have lower quality of life. In a study by Goodman and colleagues for the purpose of promoting emotional representation in SLE patients, intervention changed *treatment control*, *identity* and *emotional representation* [45].In another study by Milani et al with the purpose of changing emotional representation in Multiple Sclerosis patients after the implementing the intervention the highest promotion was observed for *identity* [46].Patients don't have an accurate perception of their illness and on the other hand care givers have not paid attention to this manner and its effect on quality of life. Also they have not been educated regarding the symptoms and timeline. Conversely, patients who have truthful perception of illness and patients who believe their illness is comprehensible (have higher coherence) experience higher quality of life.

A substantial finding of this research is that there was no significant association between *timeline (chronic/acute)* and any of the variables of quality of life. However in opposite to other studies, *cyclical timeline* had association with few of the variables of quality of life [25-29]. In addition patients with chronic illnesses had negative perception, lower quality of life and several consequences. But patients with acute illnesses had positive perception and better quality of life. In Seawall's study, perception of illness was assessed in SLE couples and was observed that chronic timeline is not always negative. Couples with negative but similar timeline had higher quality of life. In this study in contrast to previous studies there was no significant association between disease timeline and quality of life which could be due to illness experience differences. Although chronic disease, in general have similar characterizes they differ in kind, frequency of symptoms, severity, disability status and their effect on psychological and social function [16].In this study approximately 7 years had passed since the commencement of their disease therefore patients considered SLE as a chronic disorder and were adapted to the situation. When people face chronic disease for a long period they gain experience for overcoming and self-controlling. In fact studies have revealed that

long period of SLE, strengthens patients and reduces their anxiety and worry. This phenomenon is called coherence [47-49].

Another reason for the disassociation between disease timeline and HRQOL is that in chronic disorders patients may have positive perception for managing stress [50]. Since most of the disease timeline questions in the IPQ-R questionnaire are retrospective (for example: my disease will be better after a while) therefore most of the patients in this study believed they will be cured in the future. In this case patients will not overestimate their consequences. Thus proficiency along with feeling laudable and also having hope for a better future motivates patients for managing their situation significantly. This manner influences patients for using managing strategies to change their situation and increase personal facilities. In this case negative disease timeline (chronic disease) will not have a significant effect on quality of life.

Conclusion

The present study has used the self-regulation model for determining disease behaviors, methods for encountering symptoms, and defeating SLE. The results of this study indicate that negative perception of disease is associated with negative results and lower quality of life and positive perception is associated with higher quality of life. According to the undeniable effects of perception of illness on quality of life we can use the findings of the present study for planning educational programs, assessing effectiveness of treatments, and decreasing the burden of treatment costs on patients, their family and the society. Subsequently SLE is better controlled, its consequences are reduced, and quality of life is enhanced.

The limitations of the present study are: first, this study was a sectional approach and did not conclude causative relationships. Secondly, due to limitations in research records for SLE in other sub-cultures we cannot generalize our results to other statistical societies. It is strongly recommended to accomplish similar studies in other statistical societies by controlling socio-cultural variables and also planning studies with the aim of changing emotional representation for illnesses.

Acknowledgment

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The Efficacy of Puppetry Performances by Handmade Puppets on Life Expectancy of Multiple Sclerosis Patients

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Abstract

Background: This study is an attempt to examine the efficacy of puppetry performances by handmade puppets on life expectancy of multiple sclerosis patients. **Methods:** This study was a quasi-experimental research design in which pre-tests and post-tests were conducted with the control group. The population of the study consists of all members of Iran's M.S society in 2015. 14 patients were randomly chosen were placed in two 7-member groups as control and experimental. The Miller's life expectancy questionnaire was distributed among two groups. The patients in the treatment group were exposed to puppetry performances by handmade puppets, six 120-minitue sessions. These puppetry performances originated puppets are used in ceremony of praying for rain among Kurdistan's nomads. The life expectancy level was measured for the two groups using the aforementioned questionnaire. The research hypotheses were tested by one-way analysis of variance. **Results**: The slope of the regression in the life expectancy variable failed to be established. Considering this fact that the covariance analysis was strong against the deviation from this parameter consequently the one-way analysis of variance was employed. The results depicted that the F value was significant at the level of 0.01. **Conclusion:** Making puppets to perform acts and to discover the thoughts were effective and suggested to people to express their feelings and ideas. It helps to express issues which are not offered in normal situations. This paper seems to show positive effects of puppetry performances by handmade puppets in the standardized criteria of life expectancy among multiple sclerosis Patients.

Keywords: multiple sclerosis, puppetry performance, handmade puppets, life expectancy.

Introduction

Multiple sclerosis (M.S) is a demyelinating disease which harms and damages the nervous system. This diseases gradually demolishes insulating covers of nerve cells in the nervous system. It is placed in the category of demyelinating diseases that disables the immune system. The signs and symptoms of this diseases are too many and most of M.S patients may experience the signs of recovery and recrudescence for many years. Finally the trend continues till the person becomes fully disabled or dies[1]. Thus due to the unclear prognosis and the lack of a definite cure for this diseases most MS patients will change their lifestyle and attitudes as soon as they are told or find out that they are afflicted with MS[2]. Those experiencing acute and severe diseases would be disappointed in life because of the anxiety resulted from knowing the disease. Research on life expectancy shows that hope plays a pivotal role in one's life and it is described as being motivated and in positive state which offers clear goals for one. In hope there is a strong motivation to move towards one's wishes and goals then examine suitable solutions to achieve the goals. Drama therapy or puppetry performance are art therapies in that people by playing these roles obtain more conditions of compatibility. The performance of play by puppets, tools and things, and the childish stories and tales have been among the preliminary methods of teaching in humans' life and came in handy in drama therapy[3]. Humans made use of puppets in their plays to release the hidden magic in the things and to share this enjoyment with others. Next puppetry performance was created and humans have found their partners for some thousand years. Countries such as China, India, Iran, Japan, etc. have had their own contributions to the development of these tools for expressing feelings. Among the countries with many years of precedence in puppetry performances Iran holds a special position in this regard since it is a geographical and connecting circle and have had an important role in the exchange of humans' experiences. The praying for rain ceremony was one of the oldest rituals among Iranians in

Western areas of Iran. In such rituals custom puppets are used. Praying-for-rain puppets are present in the rituals in three ways of which two ways are associated with things. The first thing is two pieces of wood which are connected to each other crossing over of the two pieces. The second thing is different spoons or water sprinkler. The third form or type is the appearance of puppets in the form of humans. People in the Kurdistan areas pray for rain by means of the first approach and decorate them by colorful and pretty tissues. They call them rain bride (in Kurdish dialect: BoukehBaraneh).And finally the puppet is given to a young girl which is the symbol of innocence and purity. The young girl wanders in the village with the puppet and everybody prays for the rainfall. These rituals are the reminder of Anahita which was the god of Water and their traditions and customs are reviewed by making the rain bride and the signs of life expectancy appear in the difficult times. Although in this ceremony the rain bride is not the absolute power like Anahita and is only a mediator for requesting rainfall there is hidden power in this puppet which can create a dialogue between those living in the sky and earth performing an ulterior function[4].

Using ritual puppets and tissue-made dolls is a new branch in art therapy for the MS patients therefore our library and internet research did not find any similar studies. Some relevant studies, however are worth mentioning. These studies focused on the positive effects of art therapy such as psychodrama, painting and pottery on the MS patients. To give an example the study by Vincent (2012) showed that art therapy had positive effects on the spiritual health and the promotion of life expectancy as well as cultivating new attitudes toward different issues among the MS patients[5]. Dehnavi (2015) in his article illustrated that psychodrama methods with a unity-center approach could reduce the anxiety about dying and ameliorate the coherence and resilience feeling among the MS patients. Marise Lariviere (2011) in his study reached a conclusion that directed art therapies with a mindfulness-based approach could reduce stress and increase the quality of life in MS patients[6]. On the account of what was mentioned previously, this question was posed for this study: Does puppetry performance by handmade puppets affect MS patients' expectancy of life?

Method

This article is based on a quasi-experimental method and made use of pre-tests and post-tests design with a control group. The population of the research was made up of MS female and male patients who are members of Iran's M.S society in Tehran in 2015. From the population of the study, 14 patients were randomly chosen and were placed in 2 seven-member groups which were the control and treatment groups. The sampling technique was convenience sampling. The method used to calculate the sampling was a simple random and due to difficulty in having accessing to the patients and the small sample size (15 patients), from the patients referred and participated in the workshops by the MS society, 50 % of were chosen as the sample. The participants were randomly placed in the two groups of control and treatment. The life expectancy test was carried out among the two groups and they were given a score. The puppetry performance workshop by the handmade puppets was held for the treatment group. The participants attended the workshop of puppetry performance which is rooted in the culture of puppets used for the praying-for-rain ritual in the Kurdistan areas of Iran. All the steps and stages of puppet making and puppetry performance were done by means of teamwork. The participants were provided with tools and equipment needed to make puppets. Each session lasted for two hours. Based on the conditions the participants had this chance to ask for help from the researcher team. This treatment program was conducted in two sessions per week or six sessions in total. In the first session the members were introduced to each other and a sketch of the history of puppetry performance in Iran, and tools as well as the equipment needed were presented to them. The second, third and fourth sessions were devoted to the creation of the puppets, puppetry performances, identity definition, an identity card for the puppets and the familiarity of the participants with others' handicrafts. In the fifth and sixth sessions the participants got involved with the creation of a play and performance and after some exercises they acted in the roles they were assigned. Then they expressed their feelings about making handicrafts and discussed their roles and the idea of creating puppets as well as working in a team. After the last session of treatment the life expectancy test was administered among the control and treatment groups. After the post-test on the control group, two workshops were held for this group. The data obtained from the sessions and test were analyzed using descriptive and inferential (one-way covariance analysis) statistics. This technique can be used only for numerical data[7]. Inclusion criteria including ages 20 to 50 years, the ability of hands and verbal ability of patients. Exclusion criteria including ages less than 20 and more than 50, inability of hands and verbal inability.

Miller's questionnaire of life expectancy: This test is a type of diagnostic test and includes 48 aspects of hoping, distress and disappointment. The statements in the questionnaire were stated according to overt and covert opinions of hopeful and disappointed people. In front of each item representing special behavior, the agreement and disagreement phrases were written: completely disagree, disagree, no idea, agree and completely agree. Some items in the Miller's questionnaire contain negative statements. To measure the validity of the questionnaire, Hosseini (2006) utilized score criteria. The total score of the questionnaire was determined by correlating test scores with

criterion scores obtained and it was found that there was a significant relationship between the two (r=0.61 and P>0.001) and to determine the reliability of the questionnaire, Cronbach's alpha and the split-half method were utilized and their coefficients were 0.90 and 0.89. Also in Hosseinian's (2007) study to determine the reliability of the questionnaire Cronbach's alpha and the split-half method were taken into consideration and the reliabilities for the whole test were measured as 0.69 and 0.65 implying acceptable reliabilities. To measure the validity of the questionnaire the total score for the questionnaire was correlated with criterion scores obtained from the participants and it was found that there was a significant relationship between the two (r=0.50 and p<0.002). In this research the reliability of the life expectancy questionnaire was measured by Cronbach's alpha and split-half, and 95% and 94% were achieved showing an excellent reliability. In order to measure the validity of the said questionnaire the total score for the questionnaire was correlated with criterion scores obtained from the participants and it was found that there was a significant relationship between the two (r=52% and p<0.0001)[8]. SPSS software was used for analyzing data.

Results

The study showed that the mean and standard deviation of age for the treatment group were 36.00 and 11.94 respectively and for the control group these were 33.14 and 5.98 respectively suggesting that no significant difference between the two was detected (t- 0.566, p>0.05). In the treatment and control groups, there were two and three married participants, and one and two employed participants. Table 1 shows the mean and the standard deviation of dependent variables of the research including life expectancy of the participants in the two groups of treatment and control at the two stages of pre-tests and post-tests.

Table 1: Descriptive data including mean and standard deviation of life expectancy in the pre-test and post-test

Stage	Variable	Mean	Standard deviation	Shapiro–Wilk test	Shapiro–Wilk test (After modification)	Mean	Standard deviation	Shapiro–Wilk test
Pre-test	Life expectancy	145.00	47.06	0.789*	0.857	148.71	13.08	0.930
Post-test	Life expectancy	181.42	17.76	0.774*	0.862	146.08	15.13	0.890

Shapiro–Wilk index concerning the life expectancy in two stages of pre-tests and post-tests was significant at the level of 0.05. Thus outliers in each variable were examined in the first stage and were omitted in the second stage and were estimated in the third stage by the expectation maximization imputation. After modifying the data related to the non-normal variables the mean and standard deviation changed as follow: A) the modified mean and standard deviation for the pre-test of life expectancy in the treatment group were 160.16 and 24.59. B) The modified mean and standard deviation for the post-test of life expectancy in the treatment group were 175.16 and 6.41.The parameters of covariance analysis were examined. The parameter of the normality of data distribution was presented in Table 1 and the other three parameters of covariance analysis (including the independent test for pre-test variables) group membership variable, test of homogeneity of variances for post-test variables errors in the treatment group and homogeneity slope of regression between the pre-test and post-test in the two groups of treatment and control were measured. To test the research hypothesis, the one-way covariance analysis was conducted. The analysis results showed that the F value resulted from the covariance analysis was significant at the level of 0.01 (partial $\eta 2= 0.616$, F (1 and 11) – 17.675, P<0.01). This means that conducting the independent variable can make a difference between the two groups of control and treatment significant. In Table 2the results of one-way covariance analysis for the first hypothesis can be seen. According to the achieved results, it is safe to say that the dependent variable was significantly affected by the independent variable at the level of 0.01. Following the comparison between the means for the two groups in the pre-test and post-test of life expectancy it can be asserted that the scores of the treatment group ($\Delta \bar{x}$- 15) were promoted in comparison with the control group ($\Delta \bar{x}$- -2.63). On the whole, the conclusion can be drawn on the basis of the evidence that promoting the independent variable could promote life expectancy.

Table 2: The results of one-way covariance analysis in testing the first hypothesis

Source	Total squares	Standard deviation	Mean squares	F	partial η2
Group	2294.743	1	2294.743	17.675**	0.616
Error	1428.108	11	129.828		

P**< 0.01

Discussion

In fact puppetry performance is a road to the world of fancy and humans can enter it by means of dreaming and fantasizing. When puppetry performance is employed as a process of therapy two major therapy process occur: 1. People reduce their feelings by repeating real and distressful scenes from their life which is full of internal tensions and conflicts and 2. By portraying the scenes and imaginary events which are composed of hopes, fears, and unfinished tasks of the mind, the person becomes motivated and can exercise appropriate decision-making approaches. So the MS patients build and create some parts of their stressful life, refresh, and vitalize them or could imagine them in more tangible ways just by means of making puppets. By utilizing this approach they can express their stressful feelings in the life, manage, and relieve these tensions and conflicts. Therefore puppetry performances by handmade puppets can be used as an effective approach in expressing actual life events, promote and enhance the MS patients' deficiencies. It seems that this research could provide positive effects of puppetry performance by handmade puppets in the MS patients and its positive effects were observed in some standardized criteria of life expectancy. On the whole we can state that puppetry performance by handmade puppets are useful tools and can be employed in clinical and non-clinical stressful situations. Among the limitation of this study is difficult access to patients, uncomfortable workshop, situation and low population of patients referred to association M.S. The present study is consistent with the findings of Laryouyer (2011) and Dehnavi et al (2015).

Conclusion

According to the results, puppetry performance by handmade puppets significantly affects life expectancy of multiple sclerosis patients at the level of 0.01. It indicated that puppetry performance by handmade puppets, can improve life expectancy of multiple sclerosis patients.

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Picture1: puppetry performances by handmade puppets

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The Influential Factors on Promoting Public Exercise in the Males' Dormitories of National Universities South East of Iran

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Abstract

This paper aims to identify and prioritize the influential factors on promotion of public exercise in the males' dormitories of national universities south east of Iran. The research is a survey based applied research with regards to its method and purpose respectively. The statistical group consists of the male students residing in the dormitories of the national universities south east of Iran (N=8763) of whom the number of 368 individuals comprise the statistical sample. Sampling is conducted via the stratified convenience method. The research tool was a questionnaire devised by the author, for which the validity and reliability were calculated with the Cronbach's Alpha of ($\propto$=0.89).

For data analysis, the one sample T-test and hierarchical analysis methods were utilized. The findings indicated that all of the identified factors significantly influence the promotion of public exercise in the males' dormitories. Prioritization of the factors conducted through the AHP (Analytic Hierarchy process) method yielded the following order of influence: structural factor, time, management, individual and cultural. According to the results of the research, it can be concluded that by planning and concentrating on the influential factors on the promotion of public exercise in males' dormitories, a proper environment for more enthusiastic attitudes of the students towards public exercise can be achieved.

Keywords: Dormitory, National universities, Males, Public exercise, AHP

Introduction

Human in each stage of life has varying needs based on the type and amount of his physical activity, and those needs require to be responded to. Human as a social being mainly inhabits residential communities such as villages or cities. By the elevation of the level of living in the cities, the type and amount of physical activities have changed and the need for physical activities for the procurement of living requirements has decreased. Therefore, the energies that have to be spent in that way can now seek their outlet in sports, improving the physical and mental capabilities of the individual. Thus, people need to exercise on scheduled basis for meeting their need for movement in order to benefit from its advantages. Physical inactivity can lead to many problems, including bodily defects (cardiac disease, brittle bones, early aging) and also mental and psychological problems (depression, stress and anxiety) [20]. Less than one third of the world's population have adequate physical exercise and physical activity is degrading regrettably throughout all of the stages of youth. Physical inactivity is more common among some social groups such as women, the elderly and people of lower social and economic level. The youth is an age during which the background for many dangerous illnesses of the middle and old ages is formed. Among the factors that are mentioned as obstacles of women's participation in physical activities are issues such as shortage of time, inadequate motivation, support and guidance, feelings of incompetence, shortage of safe facilities, limitation of access to the facilities of physical expertise and indifference towards the benefits of physical activity [26]. Public exercise is a form of physical activity with regular presence in physical activities, leading to physical and mental health and well-being and forming social communications with generally positive results [20]. It can be used as a low-cost and enjoyable and yet effective tool that is publicly usable and be placed in the daily schedule of the

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people's life, greatly improving the level of their social, physical and mental health. Therefore, the administrators of exercise, health and well-being must conduct investigations on the means for increasing the number of participants in public exercise [1]. For better description of the matter it could be said that people (males and females) have very diverse motivations for participating in physical activities. Some of the motivating factors such as social, environmental and cultural factors can prove influential on the willingness of an individual for participation in physical and sporting activities [2]. Tumusiime (2004) states that real or mentally-constructed obstacles can effectively prevent the initiation, continuation or re-initiation of physical activities. The studies conducted on this case indicate that factors such as time shortage, inadequate facilities, high occupation, weariness and impatience are the most dominant obstacles of participation in physical activities [2]. The studies conducted in the Europe continent show that the main event in the counties of that continent is public exercise. In America 57% of women and 72% of men take part in public exercise while in Iran participation in public exercise was reported as 5.9% in 2001 [24]. The most important reasons for this low ratio of participation are mechanization of life and increase of idle times, followed by low physical activity. Health and threatening diseases for humans are among the topics that have occupied the researchers. Obesity has also increased during the recent years, especially in the developing counties. The statistics published from the health and disease plan of Iran's Ministry of Health and Medicine show that in the 15+ age group, the spread of weigh-gain, and obesity were 25.2% and 10.3% respectively. As reported by the World Health Organization after smoking, high blood pressure is the second major cause of death among the developing countries and the third main dangerous factor among non-contagious diseases. This disease has various degrees of spread among different communities ranging from 10% to more than 60 % between different countries [20]. It's noteworthy that the academic society and especially our students also face this predicament and since students are preparing themselves for participation in various parts of the social, cultural and economic structure, it's essential for them to possess proper physical and mental health. According to the findings of the experts in 2001 only 10% of the students in Iran participated in sports from which 20,000 of the female students were covered by public exercise forming approx. 5% of the student population of that year [21]. Asadi (2002) concluded that 38% of the Iranian students never exercise, 57.7% of them don't allocate any time for sports in the dorms, and 4.9% of them are members of their dorm sport teams while 76.9% aren't members of any particular sports team. Only 29.4% of the sporting activities of the universities are allocated for public and recreational exercise while the students prioritized the items of: public and recreational exercise (45.4%), sports training (32%) and proper sporting events (26.6%) as their most desired requirements [3]. Also Ramezan-Khani et al (2012) concluded that the activity level of males is higher than females which is due to better sporting facilities, tools and amenities in the males' dorms and also higher tendency among the male students for group sports such as soccer. It's possible that another factor for higher exercise time among the males is their more freedom for doing sports and better access to sports facilities [26]. Faraj-Allahi (1994) concluded that only 17% of the female students of the Tehran University do sports. The students introduced the inadequacy of extra-curricular sports programs as the reason for their lack of participation in sports. Sabbagh Langaroudi (1995) pointed out the inadequacy of sports facilities in the Esfahan University as one of the most important reasons for the male students' lack of participation in physical activities. Nevertheless, Safavi Zadeh (2002) concluded that both groups of female and male students of the Amir Kabir Industrial University were unsatisfied with the sports facilities of that university. Cheryl (2000) in his study on the participation ratio of the students in the sporting activities of The Stanford University concluded that in the 1996-97 academic year 45% of the female students and 55% of the male students had participated in the sporting activities of that university which indicates a 5% increase compared to the duration of 1991-92. On the other hand Crombie et.al (2006) deduced that the most important obstacle of spending time on sports during the idle times, is lack of interest. Miller and Kissinger (2007) in their study titled "the role of sports in the life of the southern colleges of The United States" concluded that approximately 60% of the students participate in the intra-academic sporting activities of the colleges. In our age, physical movement of the body is reduced due to technological sophistication and scientific progress, replacing it with machines. This has led to undesirable physical and mental effects on human beings [22]. All of the scientific findings confirm the necessity of physical activity and the adverse effects of idleness and inactivity on the material and spiritual life of the human. For example in The United States 12% of deaths are caused by inactive lives and this matter gains even more importance when inactivity is considered as the most common correctible factor. Obesity and increase of BMI is directly related with cardiac and coronary disease, which while being caused by reduction of physical activity are among the major causes of death in the world. Taking such mental and physical problems into consideration in addition to the young age of Iran's population Iran needs to prepare itself for promoting physical activities, movement and public exercise [31].

In public exercise, everybody participates within their own limitations and no longer seek to merely watch the stars of competitions, but in fact turn mere slogans into realities. On the other side since professional sports cannot attract

the participation of everyone due to various limitations and especial conditions in addition to the fact that different sciences have recognized unique benefits in sports and physical activities, a matter that has been confirmed by many empirical researches the most essential and practical strategy for achieving this goal is to guide and encourage the public to participate in public exercise. Because of the ease of access and implementation of this practice this part of sports can be performed by different people at any time and most important of all it doesn't require special equipment or facilities or demand difficult movements or require particular physical conditions, and is also implementable via low-cost methods [33].

Since the students are the builders of Iran's future, taking the effort for improving their level of mental and physical health guarantees a healthy society for the future. There are various methods for realizing this purpose, among which physical activities, particularly the ones that are in the form of public and recreational activities, are of special importance. Sports are beneficial for all students but their importance is even higher for non-local students since due to their not being from their education area their usage of the facilities and sports buildings of their place of education is lower and also due to their distance from their families, have longer idle times that need to be filed in a proper way. Therefore sports activities performable in the dormitories will not only satisfy their need for physical activities but also effectively enrich their idle times [10].

On the other hand life in the environment of a student dorm requires higher energy and capability due to separation from family and taking on new responsibilities. If left unattended, these unsatisfied needs may form the ground for educational slump, psychological disorders such as depression, tendency towards harmful entertainments and recreation [30]. In spite of the increase in public awareness regarding the adverse effects of inactivity, according to the current evidence, only a low percentage of the academic society of Iran take part in the sports programs of the universities and since the students form an important part of the society, allocating more attention to their physical education and exercise can prove quite productive and yield positive results [2]. It's obvious that physical activities and participation in the public exercise activities of the universities can have a significant share in the improvement of the physical, mental and social health of the academic society. Studying the motivations of the students residing in dormitories for participation in the sports programs of the universities, helps with recognizing the factors of promoting their participation in sports and can result in the extraction of useful information regarding the encouraging and obstacle factors for this matter and also incite them to take a more active part in sports programs. It also helps the authorities planning sports activities in the universities to better schedule sporting plans and remove the existing obstructions.

Research method

This research was conducted in a survey-based, field study manner. The statistical group of the study consists of the male students residing in the dormitories of the universities in south east of Iran (N=8763) that include the Universities of Shahid Bahonar University of Kerman, University of Jiroft, University of Sirjan, University of Vali-Asr in Rafsanjan, University of Bam, University of Hormozgan, University of Sistan and University of Zabol. The statistical sample consists of 368 students (N=368) using the stratified convenience sampling method according to Morgan's table. For prioritization of the factors, 40 questionnaires were distributed among the experts (members of the sports associations of the dorms) after verification by the experts at the management group.

The data utilized in this research was gathered using two designed devised by the scholar. The first questionnaire was used for investigating hypothesizes of the design from which the three axis of writing, principles of measurement and the overall appearance of the questionnaire were taken into consideration. For determining the importance of each factor, another questionnaire was designed and their weights were determined using pair-wise comparisons. The said questionnaire was verified by 10 experts at sports management to confirm its apparent validity, and afterwards its actual validity was determined using the statistical model (CVI=0.86). Also in order to determine the validity of the structure, the method of heuristic factor analysis was utilized. For this purpose the KMO Test was used to find out the adequacy of the sample volume. The KMO for the whole questionnaire was determined as 0.944 and the Bartlett's Test was used to measure the correlation between the statements. The inherent reliability index was measured with the Cronbach's Alpha of ($\alpha = 0.89$). The questionnaire was designed in two parts: the first part included 15 questions regarding personal information such as the age, marital state, academic major, university of education, educational course, type of sports activities in university, favorite sports environment, idle times during the day, state of employment during education, extents of the effects of public exercise on body and mind, mean amount of sports activities during the recent 6 months, athletic achievements, athletic family members and their number.

The second part included the main questions of the research, with 46 statements ordered by Likert's scale (very low = 1, low = 2, moderate = 3, high = 4 and vary high = 5). The questions were about the influential factors on promotion of public exercise in the males' dormitories of the national universities south east of Iran, using 6 sub-scales of : management factor (15 questions), structural factor (7 questions), individual factor (9 questions), social support factor (5 questions), time factor (4 questions) and cultural factor (6 questions).

In this research, the two methods of descriptive statistics and deductive statistics were utilized. Descriptive statistics were used for organizing the raw scores, describing the sample sizes, adjusting the table of frequency distribution, percentiles and calculating the dispersion indices such as the mean value, standard deviation and the charts. For the deductive statistics part, heuristic factor analysis, one sample T-test and the AHP hierarchical analysis process were utilized.

The results and findings of the research

Investigating the demographic attributes of the research sample revealed that the age range of the students under study was between 18-32 years, with an average of 22.84 ± 2.36 years. The most hours spent on sports during 24 hours was during 18-21 PM that constitute 39% of the total students and the least hours were during 12-15 PM with 3% of the students. Concerning the amount of idle time during 24 hours, 41.8% of the research sample had an idle time of 1-2 hours during 24 hours who had the most of the statistical results.

Table 5 contains the results indicating significant difference between the mean values of all factors with the index benchmark ($P < 0.05$).

Table 1: Results of the one simple T-test related to the research hypothesizes

Public exercise in dorms	Number	Standard F $\pm$the mean value	Mean variance	T	Level of significance
Index number = 3					
Management	368	3.80 ± 0.64	0.80	24.32	0.001
Structural	368	3.85 ± 0.91	0.85	18.93	0.001
Cultural	368	3.80 ± 0.73	0.80	21.68	0.001
Individual	368	3.74 ± 9.75	0.74	19.61	0.001
Time	368	3.78 ± 0.64	0.78	23.90	0.001

Finally the prioritization of the main influential factors on promotion of public exercise in the males' dormitories of the universities south east of Iran was carried out using the AHP method. In the first step of using AHP, the hierarchy tree was created using the determined factors at the two levels of goals and indices. Accordingly, the goal which was finding the influential factors on promotion of public exercise in the males' dormitories of the universities southeast on Iran received the highest priority. In the second place, the five indices of management, structural, cultural, individual and time were placed. Fig. 1 shows the created hierarchical tree.
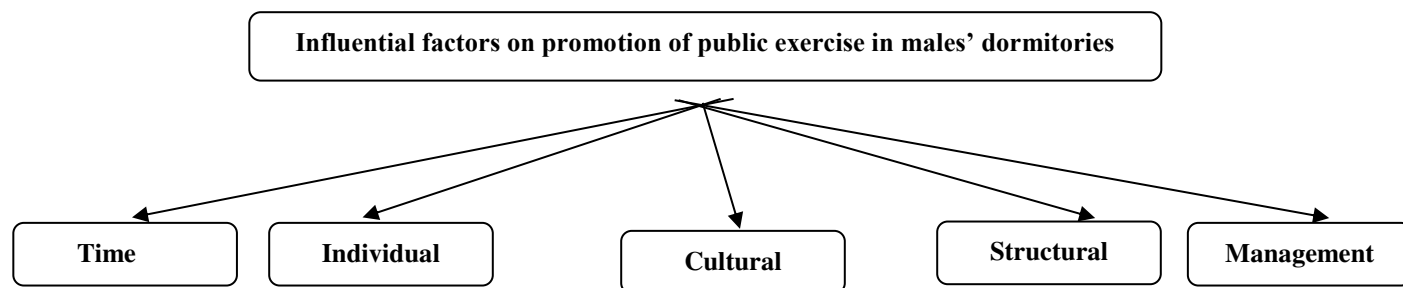
Fig. 1. The hierarchical tree of the influential factors on promotion of public exercise in the males' dormitories applying the AHP method

In the next step of using the AHP method for the purpose of determining the weight and priority of each factor and experts were requested to specify the relative importance of various indices through pair-wise comparison between each two items. For this purpose, they were provided with table in the form of a questionnaire and asked to give a number from 1-9 to each factor after pair-wise comparisons, indicating their relative importance. In fact, these comparisons indicate the weight of each factor as compared against other options under evaluation for decision making. In the next stage, the completed tables were collected and investigated for their ratio of incompatibility. Calculation of incompatibility ratio is conducted in order to determine whether there is any compatibility between the pair-wise comparisons or not. If the ratio of incompatibility is less or equal to 0.1 then there is acceptable compatibility in the pair-wise comparisons. Finally the opinions of respondents were integrated together.

Table 2: Prioritization of the influential factors on promotion of public exercise in the males' dormitories of the universities south east of Iran using the AHP method

priorities	Final weight	Individual	Cultural	Time	Management	Structural	Influential factors on public exercise
1	0.352	1.93.7	2.1160	2.5945	2.5810	1	Structural
3	1.152	1.66808	2.2947	0.3000	1	0.3854	Management
2	0.266	1.5336	3.1533	1	3.3333	0.3874	Time
5	0.110	1.3903	1	0.4359	0.3171	0.4735	Cultural
4	0.120	1	0.7192	0.5949	0.6520	0.5179	Individual
Incompatibility ration (IR) = 0.07							

The results presented in Table 6 indicate that the structural factor, with the final weight of 0.352 and the cultural factor, with the final weight of 0.110 are ranked with the highest and lowest priorities, respectively.

Discussion and conclusion

In this era during which physical activity has reduced due to technological breakthroughs and scientific progress which in turn has led to undesirable physical and mental effects on the humans. Iran needs to prepare itself for increasing physical activities and public exercise especially considering its relatively young population. Generally speaking the factor of management has been recognized as one of the influential factors for promotion of public exercise in the males' dormitories. The findings of the current study are concordant with other studies (5, 11, 2, 33, 6, 23] Asihel (2005) stated the management factor as one of the least important factors of promoting public exercise in a study conducted on the students residing in the dormitories of the West keep University in South Africa, which is controversial to the result of this research. It's possible that one of the reasons of this contradiction is the higher attention of the managers and authorities in the western counties to the topic of public exercise especially among the students, which could be due to the realization that one of the most important factors for the progress of their counties is possession of a functional human workforce. The results of the majority of the studies conducted in those counties bear witness to this argument. The factor of management ranked in the 3rd place after applying the AHP method for prioritization of factors which could be due to the fact that in Iran, under the influence of various reasons including: type of substructures, cultural issues, type of planning, position of the males in the society, etc., tracing management factors is easier and more feasible in the sector of males.

The structural factor was recognized as one of the influential factors for promotion of public exercise in males' dormitories, also taking the first priority after using the AHP method. This indicated its high importance as an influential factor on promotion of public exercise in males' dormitories. Usually the sports facilities of universities are located closer to physical education departments and in some universities, these buildings are quite distant from the dormitory students. On the other hand the growth in the number of students is not in proper proportions with the substructures especially sports facilities and the per capita of sports facilities in the universities is in constant degradation.

Although a portion of the Ministry of Science's physical education department is allocated to the expansion and equipment of sports facilities and spaces of universities, but it seems that the said budget is not enough, especially for equipping the sports facilities belonging to the dormitories related to universities and the students have stated the deficiencies of this actor as one of the obstacles for promotion of public exercise. The findings of the current study is concordant with previous studies [2, 25, 33, 17, 16, 12] which introduce the structural factor as one of the most important factors for promotion of public exercise.

Since the cultural factor tanked 5th after the AHP prioritization, it seems that the culture of performing sports activities is well-accepted among the student body, especially male students, and possessing a fit and strong body for them is supported by all casts of the society. During the recent ages, this matter has not lost its importance and today's families plan for achieving this goal. The rank of this factor in the research indicates that culture of public exercise is greatly instilled among the males [17, 5, 33, 6, 2]. Accordingly Azizi et.al (2011) recognize the benefits of holding sports conventions and workshops at the level of dormitories for promotion of sports culture in the dormitories and motivation of the students for participation in public exercise. Etghia (2008) marks the importance of effective informing by the authorities in rising the motivation level of the students for participation in public exercise.

The individual factor ranked 4th in AHP prioritization. This factor induces less motivation form participation in public exercise compared to other factors. Therefore, a good practice for elimination of individual obstacles can be holding intra-sectoral or extra-sectoral sports events and competitions that will possible elevate the motivation of dorm students for physical exercise and participation in public exercise programs. Enthusiasm for movement and elimination of weariness and indolence are among other significant contributors to the individual factor, leading to the increased participation of the male students in physical exercise. It seems that for this field elevating the awareness of individuals through education and induction of motivation and encouragement can prove effective. The findings of the current study are concordat with those of the studies [2, 1, 32, 17, 34], that indicate the individual factor as effective on the promotion of public exercise. Zahedi (2011), after conducting a research on the managers of the federation of public exercise, experts of the department of public exercise, managers of the provincial public boards and directors of public exercise associations concluded that the individual factor is not among the influential factors on the promotion of public exercise, which is inconsistent with the findings of the current research. This inconsistency can be due to a different choice of statistical groups or difference of opinions among the statistical groups utilized by the studies.

The time factor ranked 2nd after prioritization by the AHP method. The participants in this research believed that this factor was of relatively high influence in motivating the male students for participation in public exercise activities. Considering the overlap between the hours of academic courses, extra-curricular activities of the university with extra-curricular sports activities of the dorms and the interference with the specific time allocated to sports facilities and the shortage of extra-curricular hours for the sports facilities of the universities in addition to shortage of time due to various reasons such as part-time working, supporting the families, etc., it can be proposed that the universities must pay more attention to the idle and free times of the students in their planning, scheduling the extra-curricular programs according to the free times of the students. Such measure can lead to the promotion of public exercise throughout universities and dormitories. The findings of this research are compliant with the studies [2, 14, 12, 16] in this regard.

In this research, the desired time for doing sports was also investigated, showing that the most desirable time of day for conducting sports activities was during 18-21 PM, which is inconsistent with the study conducted by Ghafouri (2007). This inconsistency may originate from the varying nature of the statistical groups investigated by the two researches. The studied group in Ghafouri's work (2007) consisted of the ordinary citizens of various towns in Iran, who reported the duration of 6-9 AM as their most desirable time for sports, while the studied group in this work reported the duration of 18-21 PM as its most desirable time for exercise due to their occupation with their classes. Therefore, in planning for the universities of Iran, paying adequate attention to this issue is essential and can solve part of the obstacles for the dorm students' participation in sports activities.

In this study, the identified factors influencing the promotion of public exercise in the males' dormitories of national universities south east of Iran were prioritized applying the AHP (Analytic Hierarchy process) method. Management, individual and cultural factors were ranked with the lower priorities, respectively. The results of this research are inconsistent with the findings of the studies [14, 4, 19], which could be due to different choices of statistical groups by the two researches, in addition to varying methods of prioritization.

Thus, it appears that promotion of public exercise requires elevated awareness through education and correct planning and management in addition to proper facilities and equipment. On the other hand, schools and universities have always been considered as the two main foundations of society for promotion of the culture of sports, which means that any cultural measure in the society that don't take these foundations in consideration will lead to failure.

As a result, the first step towards eliminating the problems is identifying the influential factors on promotion of public exercise in the view of the expansive society of students. Female students are also members of these foundations, and conducting a survey among them to utilize their views in the matter can greatly influence the members of the society. Also, their views can be relied on by many individuals, and used as a major index for promotion of public exercise in the university, especially in the dormitories of national universities and among the male dorm students. Overall, it can be claimed that the factors identified as influential on promoting public exercise in the males' dormitories of the national universities south east of Iran are inter-linked in a chain manner and their nature and significance as regarded by the students must be taken into account while planning for promotion and enhancement of these factors.

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Study on water quality of Mahabad Dam River and Lake for drinking and tourism purposes

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Abstract

Water pollution is one of the problems which have been seriously taken into account. Given that the rivers are the vital resources of freshwater for agriculture, drinking, tourism purposes, etchant pollution in rivers will be considerable. This study investigates the water quality of Mahabad Dam River and Lake for drinking and tourism purposes through National Sanitation Foundation Water Quality Index (NSF-WQI) and identifies the pollution sources of Mahabad dam basin. Investigating the various causes of pollution in river and taking samples from five stations in region in accordance with existing standards, this research measures the specific quality parameters of field studies including dissolved oxygen, water temperature, essential biochemical and chemical oxygen, the most probable number of coli forms, fecal coli forms, turbidity, total dissolved solids, total solids, pH, and other quality parameters in these five different stations. According to results, Mahabad Dam River and Lake are divided into medium and good groups according to the classification based on NSF-WQI. The first group refers to medium water quality, and the second one refers to good water quality. Furthermore, the water quality of lake is appropriate for any purposes (such as drinking, fisheries, and recreation) based on the standard, but drinking water should be first treated.

Keywords: Drinking water quality index, National Sanitation Foundation Water Quality Index (NSF-WQI), Mahabad Dam River and Lake

Introduction

Limited water resources and reduced per capita of available water have led to increasing attention to qualitative and quantitative control of water resources. There is a need for accurate information about these resources in order to apply temporary and long-term planning and management on these them. The indices provide information about environment and quality of ecosystems and can be used in a basin or an entire country (Nikbakht, 2004).Due to the increased population and demand for water consumption for different purposes such as agriculture, industry and drinking, the need for investment is inevitable in water and hydraulic structures (Hashemi, 2011).The human activities and natural processes always affect the physical, chemical and biological features ofnatural bodies and cause problems in water quality of dams (Azzellino 2006).

Knowledge about quantity and quality of water resources, the way of future development in demand for appropriate water quantity and quality and related service including the recreational activities is among the basic preconditions for reasonable planning and management of water resources (Amiri, 2011).

Water deficit is one of the challenges and constraints to development of country at regional, national and local levels.In addition to deficit of water resources, the pollution of existing resources is among the problems of contemporary societies (Amiri, 2011).

Mahabad River is among the major rivers in Urmia lake basin. The natural geographical conditions of studied area in terms of climate, vegetation and geological factors along with expansion of polluting sources such as mines and environmental pollution have made pollution because of developmental conditions and environmental hazards in this basin; furthermore, due to the agricultural, animal husbandry, aquaculture, entertainment and recreational activities in nature of this region in terms of beauty and freshness, there is a high possibility of polluted surface water and consequently the lake water; and since the lake water is consumed for drinking in Mahabad City and is now the only source of drinking water in this city, the identification of pollution sources in this lake and serious action to reduce or eliminate its pollution seem very important and essential. Therefore, this study analyzes the quantitative and qualitative information of river and lake after identification of case study and conducting sampling and tests, and then compares the surface water standards with existing standards of drinking and recreation, and finally provides the managerial strategies for reducing the pollution process of basin.

Research literature

According to research by Forel during1841 to 1912, the nutrients carried by basin affect the water quality of lakes and rivers. Several studies were then conducted in years later by Noimenl and Rasonin 1939 and Lenoviderin 1968, and all of them confirmed this case (Hill, 1985).Several studies have beenabout effects of basinon water quality in Iran and the world; some of them are mentioned as follows. Rubioariaset al (2012) conducted monthly measurement on nitrogen, fluorine, chlorine, phosphorus and PH in Mexico. The obtained WQI index was good but varied, so this water was not suitable for drinking. Shokohiet al (2012) examined the balance of nutrients and compared it with NSFWQI for Biochemical oxygen demand (BOD), coliform, turbidity, conductivity, TDS, and PH parameters in Aydoghmush Dam Lake. According to their results, the good water quality index and balance of nitrate and phosphate nutrients are more in input than the output of dam. Chuanqi et al (2009) studied the statistical water quality in George triple reservoirs based on field measurements for a period of two years, and obtained the favorable, good, and bad water quality. According to them, there is a need for controlling the entry of nutrients into the reservoirs in order to avoid reducing the quality. Nueva et al (2014) studied the correlation between water quality parameters with discharge in Gheshlagh Dam of Sanandaj and found a significant correlation between a number of water quality variables in Khalifeh Torkhanand Chehel Gazisub-basins of Gheshlagh Dam of Sanandaj with discharge. According to their results, there is a significant exponential and logarithmic correlation between discharge and TDS, EC, Ca and Na in Chehel Gazi sub-basin. According to a research by Kheirollahiet al (2011) for evaluating the water quality of Karkheh Dam Lake through water quality indexes (WQI), the NSFWQI is introduced as an appropriate index for zoning Karkheh Dam Lake. The environmental impact of pollution in different parts of river has become evident and the relevant authorities can decide how to use water in various parts by monitoring physical, chemical and biological factors as well as controlling these qualitative parameters in target stations.

Introduction ofWater Quality Index (NSF-WQI)

There are numerous indices for qualitative study on surface water and the National Sanitation Foundation Water Quality Index (NSF-WQI) of US National Institute is one of the most functional and also simplest indices in all over the world (Shariat, 2006). WQI was developed by the American public health association in about 1970 and its can be utilized for monitoring water quality changes in water resources especially at different times and also for quality of water resources in an area and even around the world. The results of this index are applied for determining and explaining the health of water resources. (American public health association, 2005)

Materials and methods

Case study

Mahabad County with an area of 2591.583 square kilometers covers about 7.04 percent of province. This county is located in the height range of 1000 to 2500 meters and has a weighted average slope of 9%.Mahabad river basin is located in the south of Lake Urmia in West Azerbaijan Province. This basin has an area of 152.53 square kilometers which covers about 3 percent of Lake Urmia Basin (Abdolmaleki, 2004). Mahabad Dam Lake is built in about a kilometer southwest of Mahabad County on Mahaba driver and has rocky body with the soil core. The important rivers which pour into the lake are as the main suppliers of this lake. The most important rivers are Bitas, Dehbekrand Koter Rivers. This dam is built to control flood of rivers and irrigate the dam lands downstream with an area 20 thousand hectares and supply water of Mahabad City and generate power. Furthermore, Mahabad River is responsible for drainage of south-western part of Lake Urmia (Fatourehchi, 1998). Soil erosion in basin transfers the sediment and suspended solids to river and reservoir and is considered as the parameter of water quality and transfers the pollutants (including heavy metals, phosphorus, various toxins) along with soil into the water reservoir (President Deputy Strategic Planning and Control, 2009). According to studies in this area, the erosion and destruction in Bitas sub-basin operate in different ways below and enter a lot of sediment into the dam lake:

1- Destruction of shales often causes deep soils in most of the areas especially between valleys, and plowing them on the slopes helps destruction and erosion. Since these soils have clay loam nature, their water absorption and inflation cause landslide in valleys.
2- The shale structures have been reduced in most of the valleys, and thus the vegetation density has been reduced, and the rainfall has entered a lot of sediment into the lake.

The studied area is influenced by ecological, climate, topography, etc factors and caused diversity and distribution of different plant and range species in rangelands, and then the biotic factors such as human and animals have affected the vegetation over time and destroyed most of the climax species in this region. Due to mining in region, the soil potential is reduced for growth of plants. Furthermore, the natural processes of erosion and sedimentation are also accelerated in such areas and a large volume of soil moves towards the river (Shokoufeh, 2003).9 mining units are located in this basin and have enhanced this problem. According to conducted studies and field visits, the case study area is not industrially very advanced. Based on information received from Ministry of Industry and Mines in Western Azerbaijan province, a total of 97 industrial units are operating in Mahabad County and 88 ones are located in Mahabad Dam downstream; and the food and beverage industries accounts for the largest number of industries. 9 industrial units are located in Mahabad dam upstream and they are allocated for non-metallic products and agricultural industries.

Data collection and database creation

After determining the borders of case study or the border of Mahabad Dam basin, we have collected the information. Since the discussion and research on qualitative parameters of Mahabad Dam are the important topic, a variety of sources have been taken into account; some of them are as follows:

- Regional water authority
- Agriculture Jihad Management of county
- Veterinary Office
- Water quality information of Mahabad Dam in recent years
- Pictures and maps of Mahabad dam and lake basin
- Field visit
- Ecological, geological information, etc.
- Performing the water quality tests and so on.

In order to give more validity to research stages during a few months of seasons in years 2011 and 2012, the sampling and water quality tests were done at five stations of Mahabad Dam in basin in terms of parameters in

NSF index. After these measures and data collection, preparation of regional map, and selection of appropriate image in ArcView and ArcGis software, the database is generated and the qualitative parameters (BOD, DO, nitrate, phosphate, PH, temperature, turbidity, TDS, and fecal coliform) and final water quality are studied based on NSF quality index at stations, and then we pay attention to complications in area such as villages, roads, paths and agricultural land, etc.

Sampling stations

5 stations are considered for measuring water quality parameters of dam for drinking and recreation; and the statistics and samples are obtained from these places. Several factors are considered in choosing the site of sampling as mentioned below:

- Sampling site should be suitable for measuring the impact of lake length on quality of input water.
- We should determine the contaminated waterway leading to dam.
- These places should be near to places where are as the sources of pollution for dams and waterways as much as possible in order to investigate the changes.
- Access to these sites should be easy.
- There should not be possible to make sudden changes in their water quality.

Therefore, the selected stations are according to Table (1):

Table 1: Location of selected stations for testing

No.	Station name	Station location
1	Bitas river	Lake entrance- Hamzehabad village downstream
2	Koter river	Lake entrance - junction of Dehbekr branch with Koter
3	Jazireh station	Middle of lake
4	Dam axis	End of lake
5	Dam output	Mellat Park

Stabilization and transfer of samples to laboratory

The samples related to physicochemical and microbial test are put next to ice at temperature below four degrees Celsius in Styrofoam and the COD samples are added to stop bacterial activities in samples by sulfuric acid.

Sampling method and physicochemical and microbial tests

For sampling and testing, we used standards of 2347 and 2352 of Industrial Research Organization of Iran as well as ISO 5667 standard as well as standard method book which is an international standard. We measured the rest of factors by standard method available in book (Standard Method, 2005).

In this study, we have tried to use the high-purity chemicals to minimize the error due to chemical reactions in laboratory. Furthermore, GPS device is used to determine the locations and positions of sampling stations and implement them on map. The laboratory results are analyzed by statistical software Excel, and then the quality index is calculated by WQI Calculator software for each station.

Analysis of results

This section identifies the potential of pollution sources in Mahabad Dam Lake Basin including agricultural activities, land use, environmental status of 69 villages, 3avicultures for meat and egg-laying chickens and 2 units of stone cutting and 2 units of fish farming along with test results of five stations. Results are analyzed to facilitate comparison with existing standards.

Environmental situation of industrial units in Mahabad basin

The environmental situation of industrial aviculture, sand and cold-water fishery units are presented in Tables 3, 4 and 5 respectively.

Table 2: Environmental situation of aviculture units in Mahabad Dam basin

Aviculture name	Water consumption in cubic meters per year (5 periods)	Wastewater production in cubic meters per year (5 periods)	Wastewater disposal method	Amount of waste (tons)	Nitrogen load potential (tons per year)	Phosphorus load potential (tons per year)
Ebrahimi aviculture	900	200	Septic-Tank	175	55	8
Taavon19 aviculture	1250	325	"	260	82.5	12
Taavon 31 aviculture	450	100	"	90	27.5	4

Table 3: Environmental situation of sand units

Unit name	Type of activity	Water consumption in cubic meters		Wastewater production in cubic meters		Wastewater disposal method
		Monthly	Yearly	Monthly	Yearly	
Rasangs and Co.	Granulation of sand	140	1650	98	1170	Sequestration reservoir
Navid sand Co.	Granulation sand	130	1550	96	1090	Sequestration reservoir

Table 4: Environmental situation of cold-water fish farming units

Unit name	Type of activity	Water consumption in cubic meters		Wastewater production in cubic meters		Wastewater disposal method
		Monthly	Yearly	Monthly	Yearly	
Ghalatsan an village	Cold-water fish farming	-	-	-	-	At the time of inactive visit
Gagosh-e Sofla village	Cold-water fish farming	12960	155520	10368	124416	Direction to outside

Agricultural activities and land use in Mahabad dam basin

The area of Mahabad Dam basin is about 8753 hectares of rain fed and irrigated lands and about 1000 hectares are gardens. Fertilizers which are used in agriculture have two types of phosphate and nitrogen fertilizers. (Jihad-e-Agriculture of Mahabad, 2011) Table 6 shows the amount of consumed fertilizer in this basin; and the agriculture is more organic compared with the surrounding cities.

Table 5: Consumption of fertilizers in farms of Mahabad dam basin

Pesticide and fertilizer consumption			
Basin	**Nitrogen fertilizers (tons per year)**	**Phosphate fertilizers (tons per year)**	**Herbicides and Fungicides (L)**
Entire basin	837	113	5000

The important points in agricultural land of Lake Basin include the mountainous region and agricultural operations in steep lands as well as the lack of lake privacy and the location of farms and gardens next to the dam lake, and thus the consumed fertilizers and chemicals in these lands can directly enter into the river. For other lands, the area of forest lands of Mahabad dam basin is 2688 hectares and it has the sparse forest type; furthermore, the pasture land has an area of 71000 hectares.

Different tourism activities in Mahabad dam lake

Field studies indicate that numerous people visit Mahabad Dam at different times of year. The maximum visits are on Norouz holidays and spring and summer especially on holidays. Recreational activities beside the lake are generally divided into two categories. The first one refers to activities which are directly associated with water, and the second one refers to those activities which are performed on the beach; and they consequently cause environmental problems for region.

Investigation of fishing activities in Mahabad Dam Lake

Fishing activities are among the other factors which affect the water quality of Mahabad Dam Lake. In this area, the traditional and small-scale fishing was first common in lake of dam, but since 1987 the provincial fishery has released 500 thousand pieces of silver and common carps in Mahabaddam and this has developed the aquaculture production in this lake (Abdolmaleki, 2004). Nowadays, the fishery activities in Mahabad lake have been considered as the factors and sources of water pollution in Mahabad Dam due to the reasons such as the ecosystem change of lake and aquatics, the existence of a large number of shrimp crustacean species in lake, the increased carnivorous species (Zander) and reduced sludge-eating species, secret and nocturnal feeding. Etc, and it seems that there is a need for more monitoring by systems such as Environmental Protection Agency and water resources organization, and so on.

Study on vulnerability potential of pollution sources and comparison with benchmark

According to the obtained results in Table 7 for potential estimation of pollution load due to point and non-point pollution sources and potential of nitrogen load production; and potential of phosphorus load production in Table 8, and total pollution load of BOD in Table 9, there is medium amount of nitrogen and phosphorus pollution load production in Mahabad Dam upstream. However, there is a significant amount of upstream nutritious load, and the potential of water reservoir vulnerability to nutrients is high due to Mahabad dam reservoir and consumption of drinking water in reservoir.

Table 6: Comparison of total nitrogen load potential resulted from different pollutants with benchmark

Area	Nitrogen (tons per year) Total nitrogen load	Area (ha)	Ratio of nitrogen load to area Y.ha/Kg	Comparison with benchmark
Entire basin	996.47	82884	12	Medium

Table 7: Comparison of total phosphorus load potential resulted from different pollutants with benchmark

Area	Phosphorus(tons per year) Total phosphorus load	Area (ha)	Ratio of nitrogen load to area Y.ha/Kg	Comparison with benchmark
Entire basin	150.5	82884	1.8	Medium

Table 8: Comparison of BOD load potential resulted from different pollutants with benchmark

Area	BOD(tons per year) Total BOD load	Area (ha)	Ratio of nitrogen load to population per day	Comparison with benchmark
Entire dam basin	1.67	9612	0.4	Low

Quality status of Mahabad Dam Lake Basin in terms of acidic power

PH mean changes are negligible in all stations and thus the whole studied area.

Quality status of Mahabad Dam Lake basin in terms of total phosphate

The obtained data indicates the range of 0.02 to 0.26 milligrams per liter for total phosphate and its minimum and maximum belong to March and April in external station of dam and Koter station (one of the input branches).

Quality status of Mahabad Dam Lake Basin in terms of nitrate

The amount of nitrate ranges from 1.2 to 21.4milligrams per liter and its minimum and maximum amounts are observed in March in Koter River Station.

Quality status of Mahabad Dam Lake basin in terms of total coliforms

According to results of study on microbiological parameters, the stations 1 and 2 of rivers entering the dam lake are the most polluted sites in terms of coliforms in high-water months namely March, April and May according to the most probable number (MPN) in 100 100ml (11001100MPN/100ml).The lowest measured amount is 14MPN/100ml and belongs to station of 4 axes of dam in August (seasons with minimum entry flow rate to lake).

There are similar problems in BOD for fecal coliforms. This factor is closely related to wastewater disposal and it has maximum amount in stations 1 and 2 according to results due to the disposal of rural wastewater.

Quality zoning of Mahabad River and Lake based on NSF index at stations

The mean range of changes and standard deviation of measured values for physicochemical and microbial parameters needed to determine the National Sanitation Foundation Water Quality Index (NSF-WQI) are presented in Tables 9 and 10.

Table 9: Results of measured parameters at selected stations in studied area

Station name/ Code	Temperature			PH			T.PO3 (mg/L)			T.NO3 (mg/L)			BOD (mg/L)		
	Mean	Standard deviation	variation range	Mean	Standard deviation	variation range	Mean	Standard deviation	variation range	Mean	Standard deviation	variation range	Mean	Standard deviation	variation range
Bitas river	11.075	6.406	16.2	8.06	0.2482	0.56	0.137	0.04657	0.12	3.75	1.6	4	11	8.77	22
Koter river	9.85	4.60	11.9	8.06	0.1430	0.35	0.19	0.04062	0.1	13.47	7.88	17.9	6.75	3.76	10
Damisland	12.56	6.75	17.5	8.18	0.5444	0.7	0.084	0.01019	0.03	5.58	4.18	12	2.2	2.63	7
Dam axis	12.58	7.055	18.8	8.2	0.2449	0.7	0.08	0.00632	0.02	4.86	3.80	10.9	2.6	3.32	9
Dam output	7.9	3.098	6.5	8.02	0.2481	0.7	0.04	0.01897	0.05	5.64	5.05	14	2.6	2.24	6

Table 10: Results of measured parameters at selected stations in studied area

Station name/ Code	Turbi (NTU)			Fecal coliform (MPN)			DO (mg/L)			TDS (mg/L)		
	Mean	Standard deviation	variation range	Mean	Standard deviation	variation range	Mean	Standard deviation	variation range	Mean	Standard deviation	variation range
Bitas river	190	213.70	517	39.75	9.89	26	7.97	1.10	2.8	107.17	33.80	85.4
Koter river	298	254.17	625	61.75	12.57	35	8.02	0.696	1.7	102.8	24.40	65.8
Dam island	10.1	5.01	12.8	3.6	4.83	12	7.8	0.814	2.5	93.7	28.96	82.5
Dam axis	9.04	4.42	10.6	0.8	1.6	4	7.94	0.813	2.4	93.4	29.80	84.3
Dam output	12.08	11.03	27.9	0	0	0	7.02	1.17	3.3	136.7	83.02	225.1

Table 11: Calculated values of NSF Water Quality Index based on mean parameters through WQI Calculator

Station	PH	T.PO3	T.NO3	BOD	Turbi	coliform	DO	TDS	Tempe	WQI
Bitas river	82	95	75	30	5	57	49	83	40	57.33
Koter river	82	92	46	47	5	52	50	83	45	55.77
Dam island	78	97	62	76	76	84	48	84	35	71.11
Dam axis	77	97	66	69	78	99	49	84	35	72.66
Dam output	83	98	62	69	72	99	40	80	56	73.22

Based on the calculations for water quality index in Table 11, it is found that the best water quality belongs to stations 5, 4, and 3 and stations of dam output, axis and Island. The lowest water quality is at station 1 (Koter river) and the lowest quality belongs to station 2 (Bitas river). Therefore, based on these results, Mahabad Dam River and lake can be divided into two ranges based on WQI index. The first range includes Stations 1 and 2 which have medium status based on classification. The second range includes stations 3, 4 and 5 which have good quality status in terms of water quality index classification. The existence of farms along the river and disposal of their wastewater, which includes a variety of fertilizers and pesticides, and high-volume disposal of rural wastewater without proper treatment inside the river are among the main causes of reduced water quality of this river.

Conclusion

According to results, the water quality of river is good in comparison with standards for any consumption (such as drinking, fishery, and recreation), but drinking consumption needs common treatment. Given the obtained results, the intended indices for recreational purposes include the microbial indices, PH, algae, dissolved oxygen, and descriptive indices such as smell, taste, solids, and floating materials, oils and pesky herbs. There is a need for further study by other researchers about status of algae and their impact. According to study on PH and dissolved oxygen, Mahabad Dam Lake water is an ideal situation for recreational activities. It seems that the microbial index is the most important parameter which should be considered in recreational consumption (recreation with direct contact). Microbial indices, which are typically suggested for recreational water quality in other countries, include total coliform, fecal coliform index, E.coli and are Enterococcus. Therefore, the study on total value of coliforms and fecal coliforms in five stations and their comparison with recreational consumption indicates the good status of all stations for recreational consumption. Given that most of these activities perform at warm seasons of year in lake and rivers of basin upstream, the values of these indices are very important in spring and summer. Most of the recreational activities in Mahabad Dam Lake are performed in Island station, and perhaps the amount of fecal coliform is increased at this station during the summer.

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Investigating the relationship between anxiety and life satisfaction of eldrly people living in nursing homes of Tehran in 2015

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Abstract

Introduction: life satisfaction is an important variable at the end of human life that can be influenced by other variables. Anxiety is one of the most common problems of the elderly people. The objective of this study was to determine the relationship between anxiety and life satisfaction of elderly people living in nursing homes in Tehran in 2015.

Materials and methods: this study is a descriptive-analytic study. Statistical population included all the elderly people living in nursing homes in Tehran in 2015. Using a simple random sampling method, 217 elderly people were selected as sample. Demographic questionnaire, elderly people anxiety questionnaire, and Diener life satisfaction scale were distributed among subjects of study and they were collected after completion. Data were analyzed using descriptive statistics (frequency, mean, and standard deviation) and inferential statistics (Kolmogorov-Smirnov, Pearson, independent t-test, analysis of variance, and regression) and SPSS software.

Results: The results of study showed that anxiety was significantly correlated with education level (P=0.03) and chronic disease (P=0.03) and life satisfaction was significantly correlated with age (P=0.04). In addition, anxiety (r= -0.142) (P=0.029) had a significant relationship with life satisfaction.

Conclusion: The results showed that elderly people living in nursing homes of Tehran had high anxiety and low life satisfaction. According to the obtained results, it is recommended for authorities and planners of elderly people living in nursing homes of Tehran to focus on their anxiety and strategies to reduce it in order to increase their life satisfaction level.

Keywords: life satisfaction, anxiety, elderly people, nursing homes for the elderly people

Introduction

Introduction

Aging is a period of life begins from 65 years (60 years in Iran). Aging in many countries begins usually around the retirement age according to regulations (60 to 65 years). The process of aging is a gradual decrease in the function of body systems. Aging makes a healthy person to a weak person associated with reduced physiological capacities and increased susceptibility to many diseases and death. In studies conducted by sociologists, psychologists, biologists, and behavioral science researchers on different life stages to explain the aging, it has been stated that aging as one of man's life periods is associated with a kind of biological, physical and mental maturity and perfection. In other words, it is a bio-cognitive fate, which has a fact longer than history (3-1). Aging is one of the phenomena discussed in recent years in global health area (4). Aging is a sensitive period of life and paying attention to the problems and needs of this stage is a social necessity (5, 6). This stage of life is full of a sense of scarcity and disabilities, and the

elderly people are more vulnerable due to decreased self-esteem, impaired motor skills, loss of friends and relatives, reduced independence and the risk of chronic diseases (7, 8). Generally, with increasing age, the risk of diseases and the incidence of disabilities at the end years of life increase (9) so that a study conducted on the elderly people in Tehran shows the prevalence of disability among elderly people is high (10). However, given the rapid increase in the elderly people population, the issue of health and providing comfort and welfare for them in community finds new and broader dimensions every day (11). Life satisfaction reflects one's positive attitude towards the world where he lives. Life satisfaction is a judgment-cognitive evaluation of the personal life and it involves comparing the one's life conditions with standards that he has determined for himself (12:13). On the other hand, satisfaction has inclusive correlation with need. Need and satisfaction evolves over time and it depends on many factors in a community. Inconsistencies between goals, desires, and the needs that often arise due to specific problems are effective in life dissatisfaction (14, 6). Life satisfaction can be considered as a sign of adaptation in different aspects of life of people and in fact, it reflects the balance between one's desires and his current situation (15, 16, 17). Life satisfaction in the elderly people can be created through individual accesses to the key and important sources of life, and these sources are material, social, or personal sources that elderly people belong to them and they can be introduced as main sources in promoting and maintaining the welfare of people. In other words, these sources can help elderly people in achieving their personal goals and satisfaction of the fundamental physical and psychological needs (15). On the other hand, people at aging period experience numerous problems such as feeling loneliness, physical disease, economic problems and so on, which these conditions affect their life satisfaction (18). In addition, the life satisfaction is one of the important factors in a person's well-being and welfare and its investigation in health care system is an essential due to the close relationship between health and well-being (19). In fact, evaluation of life satisfaction of life in the elderly people is an action to assess the effectiveness of health care services provision including nursing services. Therefore, given the high significance of life satisfaction in elderly people, investigation of factors associated with this key variable is worthy of special attention (20). However, the effects of sense of loneliness and anxiety in the elderly people can be important in some aspects, which require special attention in community of the elderly people (21, 22). One of the common and important issues is anxiety and anxiety disorders (23). Despite high scientific and technological advances, disorders like depression, stress and anxiety are considered as the common diseases of century (24). In fact, relaxation and departure from depression, stress, and anxiety are basic and innate needs of each person that has been considered since old days (25). The existence of anxiety, stress, and mental problems in human life can cause negative effects on health (26). Some of these cases include hypertension, shortness of breath, increased respiratory rate, and pulse rate (27). Wolitzky-Taylor et al consider the prevalence of anxiety more than depression in the elderly people and estimate it between 3 and 14% (28).

In Iran, Rahgozar et al reported the prevalence of anxiety in elderly people 23.5% (29). In other words, due to decreased self-esteem, impaired motor skills, loss of friends and relatives, reduced independence and the risk of chronic diseases, elderly people are more prone to anxiety(32 ,31 ,8 ,7) . The study of factors associated with the life satisfaction of the elderly can contribute to our knowledge in this field. Anxiety with prevalence of 23.5% (29) in the elderly people can be considered as a potential risk factor in the life satisfaction of elderly people and damages caused by the anxiety of the elderly people can affect their life satisfaction.The importance of this issue is so that experts believe that any attempt to reduce anxiety in elderly people will protect them against complex mental problems and improve their self-esteem and life satisfaction(30) . Ghaffari et al evaluated stress and depression and anxiety levels in elderly people referring to Tehran's Jahandidegan Centers and they showed anxiety in female elderly people is higher than that in male elderly people (P≤0.001) and anxiety in patients was more than that in other people (P≤0.001). Investigating the status of stress, anxiety, and depression in the elderly people in Tehran showed prevalence of these factors in this group of people (33). Alizadeh et al (2012) examined mental health components in urban elderly population in different age groups living in Tehran. The results showed that the variables of age (P =0.012) and housing (P =0.004) and retirement with pension (P =0.048) were significantly affected the anxiety and depression disorders in elderly people (34). With regard to what was said above and the fact that so little research has been conducted to explore the anxiety and life satisfaction of the elderly people and their relations, this study was conducted to examine the relationship between anxiety and life satisfaction in elderly people living in nursing homes of Tehran. It is hoped that findings of this study provide suitable policies and strategies for planners and relevant authorities or service providers such as elderly people nurses, followed by their life satisfaction.

Method

The present research is a descriptive-analytical study. Statistical population of study included all the elderly people living in nursing homes of Tehran. Using simple random sampling method, 217 male and female elderly people living in nursing homes of Tehran were selected as sample of study. The tools used for the implementation of this research included demographic questionnaire, anxiety of the elderly people questionnaire, and the satisfaction of life questionnaire. Based on demographic questionnaire, the information including age, gender, marital status, education level, length of stay in nursing homes, chronic disease, number of drugs used, having meeting on a regular basis, and the history of departure from the home by family for party or recreation was obtained.

Geriatric Anxiety Scale: This 30-item questionnaire was developed by Segal et al. The scale of questionnaire was four-point scale of never, sometimes, often and always, in which zero score is given for never, and score 3 is given for always and the scoring range was between 0 and 90. Total score between 0 and 45 shows lower anxiety, while the score between 46 and 90 indicates high anxiety (35). Bolqanabadi et al (2013) in a study on 295 Iranian elderly people evaluated the validity of the questionnaire suitable and obtained its reliability 0.92 using Cronbach's alpha (36). Rashedi et al (2013) examined the anxiety of elderly people living in Hamadan and they reported its psychometric properties desirable (37).

Diener life satisfaction questionnaire: the questionnaire contains five phrases assessing the life satisfaction of the person by a seven-point Likers scale from strongly disagree (score 1) to strongly agree (score 7) and the range of scores changes was from 5 to 35. Total score between 5 and 20 indicates low life satisfaction and total score between 21 and 35 represents the high life satisfaction (38). Diener et al. (1985) used test-retest correlation coefficient to verify the validity and reliability that the results indicate high validity of the questionnaire (39). In addition, Bayani et al (2007) in a study on the elderly people translated the scale into Persian and reported its reliability through test-retest 0.69. It was found that this scale is a reliable and valid scale for use in the elderly people psychological studies (38).The data were analyzed using descriptive statistics (frequency, percentage, mean, and standard deviation) and inferential statistical tests (Kolmogorov-Smirnov test, Pearson Test, variance analysis, and regression) and SPSS software.

Findings

Based on the table below, the frequency of women participated in the study was more than that of men. The percentage of participants whose spouses have died was more than that of other people. The percentage of married people is 9.2 percent. The percentage of those who were 80 and 90 years old was more than that of other individuals. The percentage of illiterate people is more than that of other people. Most of people living in nursing homes by 37.8% were between living 12 and 36 months in nursing homes. More than 72 percent of the elderly people suffered from chronic diseases. The majority of elderly people take drug. In addition, 50.6% of elderly people had meeting on a regular basis.In this study, 58.9 percent of the elderly people had the experience of departure from home by family for party or recreation. Mean score of anxiety in people living in nursing homes was 60.14 and SD of them was 12.86, minimum of scores was 9 and the maximum of scores was 84. According to Table 1, it is seen that shows that there is no significant difference between males and females except for the variables of education level and chronic disease.

The mean score of life satisfaction in elderly people in this variable was 11.32 and its SD was 5.09 so that the minimum of scores was 5 and the maximum of scores was 30. In addition, 73% of elderly people had low life satisfaction and 27% of them had high life satisfaction. According to Table 1, it is seen that there is no significant difference between elderly men and women except in the variable of age. Before carrying out the analysis of the data, we examined firstly the normal distribution of variables. To examine the normal distribution of main variables, Kolmogorov-Smirnov test was used, which it showed normality of variables.

Table 1- Demographic characteristics of samples, mean, and standard deviation of study variables

			f	Anxiety		Life satisfaction	
		n	%	mean ±SD	P value	mean ±SD	P value
Gender	Female	144	66.4	(11.86) ±63.17	0.32	(5.02) ±11.17	0.55
	Male	73	33.6	(12.36) ±56.56		(5.36) ±12.56	
Marital status	Single	46	21.3	(12.39) ±61.61	0.17	(5.22) ±10.61	0.58
	Spouse died	118	54.8	(14.69) ±62.47		(5.19) ±9.47	
	Divorced	32	14.7	(10.21) ±64.45		(5.45) ±10.45	
	married	20	9.2	(12.46) ±55.76		(5.74) ±12.78	
Age group	60 to 70 years	50	23.0	(10.63) ±55.63	0.32	(5.63) ±14.63	0.04
	70 to 80 years	40	18.4	(11.54) ±59.11		(5.54) ±12.11	
	80 to 90 years	103	47.5	(10.52) ±60.02		(4.52) ±10.02	
	Over 90 years	24	11.1	(12.63) ±67.86		(4.63) ±8.86	
Education level	Illiterate	99	45.6	(12.38) ±67.74	0.03	(5.38) ±9.74	0.26
	Secondary school	76	35.1	(11.64) ±62.71		(4.64) ±10.71	
	High school	27	12.04	(11.00) ±59.33		(51.00) ±11.34	
	Academic	15	6.9	(12.30) ±54.53		(44.3086) ±12.53	
Hospitalization time	Less than 12 months	72	33.2	(11.59) ±66.14	0.11	(4.59) ±10.14	0.36
	12 to 36 months	82	37.8	(212.64) ±56.74		(4.57) ±12.74	
	36 to 60 months	20	9.2	(11.42) ±65.54		(5.02) ±11.54	
	Over 60 months	43	19.8	(12.48) ±58.12		(5.08) ±9/12	
Chronic disease	Yes	157	72.3	(11.59) ±66.78	0.03	(4.79) ±10.78	0.44
	No	620	27.7	(12.64) ±51.79		(5.646) ±12.02	
Number of drugs taken	Does not use	72	33.2	(12.41) ±58.04	0.36	(6.01) ±13.01	0.21
	1-2 drugs	82	37.8	(11.98) ±62.61		(6.13) ±11.45	
	2-5 drugs	43	19.2	(11.47) ±61.65		(5.47) ±9.76	
	Over 5 drugs	20	9.8	(11.71) ±64.36		(5.04) ±8.14	
Having regular meeting	Yes	110	50.6	(12.14) ±59.21	0.30	(5.74) ±12.04	0.09
	no	107	49.4	(12.78) ±61.07		(5.03) ±9.89	
Departure history	Yes	128	58.9	(11.73) ±57.15	0.19	(5.73) ±11.45	0.58
	no	89	41.1	(12.74) ±64.74		(5.74) ±11.11	

Table 2: Pearson correlation test results between the mean scores of anxiety and life satisfaction

	Life satisfaction
Anxiety	-0/142*

*p<0/05

Results of Table 2 show that there is a significant relationship between anxiety and life satisfaction of the elderly people living in nursing homes (p <0.05). Due to the negative value of the correlation coefficient, it can be concluded that by reducing anxiety score among the elderly people living in nursing homes, their life satisfaction increases. Therefore, the hypothesis is confirmed. To investigate and present the regression model of criterion variable of life satisfaction and predictor variable of anxiety, we presented a fitted model.

Table 3: Simple regression to predict life satisfaction through anxiety

Predictor variable	Criterion variable	β	SE	t	P value
Anxiety	Life satisfaction	1.368	0.241	5.677	0.000

According to Table 3, p value was less than significant level of 0.05, so it indicates that regression model is significant. In other words, anxiety has significant influence on the life satisfaction of the elderly living in nursing homes (p <0.05).

Discussion:

According to the findings of the study, the anxiety status of elderly people living in nursing homes in Tehran is so high, so that 61 percent of elderly people had high anxiety. In similar studies, Rashedi et al on 262 elderly people living in Hamadan reported their anxiety at higher level (37).In the present study, the anxiety level of females was more than that of males, although this difference was not statistically significant. The study conducted by Alizadeh et al (34) showed the similar finding. In the present study, singles had the lowest levels of anxiety. On the other hand, divorced elderly people had the highest anxiety. In the study conducted by Alizadeh et al, results indicated that married people had worse status than singles (34) that this finding is in line with the findings of this study.In the present study, the age group of 60-70 years had the lowest amount of anxiety. In two different research conducted in the city of Semnan in the years 2001-2003, same findings were obtained. It was found that as age of elderly people increases, their level of anxiety increases (40, 41). In explaining the findings, it should be stated that according to the same studies, aging and high age is considered as risk factor in mental health aspects of older people and to provide services and care for the elderly is in the country (42). In the present study, illiterate people had the highest level of anxiety and by increasing the education level of people their anxiety reduces. The findings showed the anxiety difference in the various groups was significant in terms of level of education. In the study conducted in Semnan, the mental health status of illiterate and low literate elderly people was obtained weaker and worse (40). Therefore, it seems that the level of education as an indicator of the development of the elderly people is considered as an important factor in the vulnerability of mental status of the elderly people. In the present study, elderly people living less than 12 months in nursing homes had the highest level of anxiety. It seems that after spending the first years in a nursing home, elderly people are highly adapted with new environment and their tension and anxiety reduce. Study findings also showed that elderly people who had chronic disease had significantly higher level of anxiety compared to those who had no chronic diseases. In addition, elderly people who had meeting regularly or elderly people who were going party and recreation by families had lower anxiety, which none of them was significant. Study findings can be justified by the fact that family is the most important source of support and interpersonal relationships that can reduce stress and anxiety in elderly people by providing the support (43). Based on the findings of this study, life satisfaction of elderly people living in Tehran nursing homes in 2015 is at the low level. Inal et al (2007) in another study on life satisfaction of elderly people living in nursing home reported their life satisfaction undesirable

(44). In general, life satisfaction is a concept that has been associated with a feeling of peace and it is considered as an important element in the process of obtaining mental health (45). Iranian elderly people have stated their life satisfaction as one of the main elements of the successful aging (17). The results of these studies are consistent with the findings of the present study. This finding could partially be justified because aging naturally is associated with various changes in the system of the body and the person with reduced ability is faced with reduced activity level and disease, which each of them can affect their life satisfaction. In the present study, married elderly people had the highest level of life satisfaction. In this regard, the study conducted by Kudo (46) and Park and Kim (47) revealed that married people have high life satisfaction. In the present study, elderly people aged 60-70 years had the highest life satisfaction. Results showed significant relationship between life satisfaction and age. In this regard, in the studies conducted by Hilleras et al in 2001 (48), they had higher life satisfaction. It seems that multiple disorders that are increased in elderly people over time to affect the quantity and quality of health behaviors that may lead to a level lower of life satisfaction. In the present study, elderly people who had academic education had the highest level of life satisfaction. In the study conducted by Kudo, elderly people with higher education had higher life satisfaction (46). Another finding of the study revealed that life satisfaction of males was more than that of females. In addition, in the present study, elderly people who were living in nursing homes for 12-36 months had the highest level of life satisfaction. In addition, the findings of the present study showed that elderly people who had meeting on regular basis and those who were going party and recreation along with their family had higher life satisfaction (43). Based on the findings of this study, the anxiety of elderly people living in nursing homes had significant relationship with their life satisfaction. The inverse correlation between these two variables means that reduced anxiety in the elderly people leads to increased life satisfaction, and vice versa. In explaining this finding, it could be explained that by changing the living environment of the elderly people from family home to nursing home, new conditions are created for them. In Iranian culture in which family is the most important source of support and family interrelations, we can reduce the stress and anxiety of elderly people by providing sufficient support. In addition, intimacy and a sense of security and support received in the elderly people leads to increased life satisfaction (43, 49).

Limitation

The first and most important limitation of this study is that it is a cross-sectional type of study. Therefore, the found relationships cannot be assumed causal relationships. These relationships might be caused by other variables, which they were not measured in this study. Another limitation of this study is the use of self-report tools. Many of these tools might collect the responses that others think that the answer should be correct (social acceptability bias). On the other hand, people may not have enough introspection and respond the without sense of responsibility. In addition, the interpretation of the results by taking cross-sectional nature of the study should be done with caution, since these results may not be generalizable to all elderly people. The other limitation of this study is the mental state of the subjects at the time of filling the questionnaires that could have an impact on their responses. The results of this study showed a clear relationship between anxiety and life satisfaction. Therefore, the results of this study can help health officials, caregivers, and especially nurses providing services for elderly people reduce their anxiety that leads to increased life satisfaction with continuous contacts with the them and identifying the unique positions such as reduced social relationships, and identifying the thoughts and beliefs of elderly people to understand and improve the relations and interactions in aging and designing educational, therapeutic, and rehabilitation plans. On the other hand, as elderly people population is increasing, expertized consultants for the elderly people are needed to increase their self-confidence and social communication and promote their mental health, which prevents unpleasant consequences, such as psychiatric disorders and ultimately suicidal of elderly people. In addition, the results of this study can be used in order to improve the designing of educational programs of those providing nursing care for elderly people and to prevent anxiety and increase the health of elderly people, promoting their life satisfaction and preventing unpleasant problems such as suicide in elderly people (50). According to the above results and the importance of anxiety in life satisfaction of elderly people living in nursing homes, it is recommended that authorities to pay more attention to the issues reduce the anxiety in elderly people living in nursing homes and begin planning in this regard. Due to the low life satisfaction of the elderly people living in nursing homes, it is recommended that educational programs to be developed in this area for elderly people. Due to the high anxiety in the elderly people living in nursing homes, implementation of mental health promotion programs is recommended.

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Anatomical relationship of the maxillary sinus with infection of upper jaw posterior teeth: A review

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Abstract

Anatomic adjacent of maxillary sinuses and the upper jaw's posterior teeth, has always created a lot of problems in the field of medicine and dentistry. The cavities existed in the body of maxillary bone in most cases is separated from the upper jaw posterior teeth by a thin plate of bone and this has made dental and sinus diseases have a close relationship. In addition, lack of awareness of this close relationship could be led to many problems.

Therefore, according to the above issues, this discussion includes review and investigation of embryology, histology, and anatomical relationship of the upper jaw teeth and sinuses , physiology and pathology of this area, correct examination and radiographic observations, clinical recommendations and surgical procedures of maxillary sinus, and methods which are used to fix the problems.

Keywords: Anatomy, Maxillary sinuses, Posterior Teeth infection

Introduction

Maxillary sinus is the largest paranasal sinus also known as Highmore's cave. It's named after Nathaniel Highmore (English anatomist),who for the first time identified the maxillary sinus(1).Maxillary sinus growth begins in the third month of fetal and reaches to its maximum size about 18 years old. The average volume of the sinuses in adults is about to 15-20 ml. The maxillary sinus has a pyramid shape and base of the sinus forms the outer wall of the nose and the apex of it is located in the near of zygomatic bone. The upper wall of sinus or sinuses roof is thin in adults and constitute orbital floor, in which the infraorbital channel and its contents pass over it. In anterior surface, anterior-lateral wall of sinus is in fact the facial part of upper jaw. The posterior wall or maxillary-sphenoidal of sinus separates the cavity from the infratemporal fossa. Lateral wall of the nose make sinus and nasal cavity apart. Sinus entrance is located in this wall and just below the sinus floor. Furthermore upright position the sinus drainage is not possible. A thin mucosa similar to nasal mucosa lines the maxillary

sinus. The mucosa is covered by cubic ciliated epithelium driving the mucosal secretes to the sinus entrance by its swipe cilia helping normal sinus drainage. Maxillary sinus lining mucous membrane is innervated by the infraorbital nerves and the superior alveolar separated from the first three-branched nerve. The blood supply is mediated by infraorbital branches, the superior alveolar and greater palatine vessels. Venous drainage occurs to the pterygoid plexus and lymph drainage to the submandibular lymph nodes (2-7). Para-nasal sinuses main functions include: strengthening and intensification of sound, breathe warming and humidifying, and cranium weight decrease(4). Intra and extra oral radiography help in diagnosis the of maxillary sinuses condition(8). Water's transmission radiography is the most useful(9, 10). In this review, attention was focused on the anatomical relationship and proximity of the gnathic sinuses to the upper jaw's posterior teeth(11). In adults, the roots of permanent molars or premolars usually develop into sinus. According to statistics, the roots of the upper jaw's first and second molars are closer to sinus than other teeth. This anatomical situation creates a lot of clinical problems in diagnosis and treatments for dentistry. For example, pain may be a symptom of maxillary sinus infection; in such cases, careful examination of teeth and sinuses will contribute to the differential diagnosis of pain(12, 13). However, in most cases, the teeth are the leading cause of sinus disease and dental treatments along with the treatment of sinus disease or even without it, can be useful in patient's complication(14-16). In this article, the clinical problems caused by this anatomic relationship is discussed in six parts: teeth-related sinus pains and vice versa, or antral fistulas, foreign bodies in the maxillary sinus, odontogenic infections of the sinuses, sinus effects on tooth bracers movement and other sinuses odontogenic damages as like neoplasia(11, 17-27). Routine and common maxillary sinus surgery is Caldwell-Luc based surgery, which accesses sinus cavity through the canine(28).

Methods of the sinuses examination

The purpose of these methods is to diagnose sinus condition.

1. Physical Examination: palpate and percussion are used more for the paranasal sinuses examination. Initially, maxillary sinuses areas carefully considered for presence of any inflation. Touch (Palpate): maxillary and frontal sinuses can only be examined with this method. But here only examination of maxillary sinuses is concerned: maxillary bone sub-zygomatic appendage pushes into and upward by thumb, index and middle fingers. There should be exist no tenderness and swelling in soft tissue of these areas. Localized tenderness associated with symptoms such as fever, pain and nasal discharge are symptoms of acute sinusitis(29).

Percussion: precision of these areas can be done in two forms:

-Direct procedures: every sinus lightly taps by index finger.

- Indirect method: the left hand index finger putted over the sinus and index finger of the right hand hit on it.

Swelling, tenderness, and sinus pain during their percussion are signs of their infection or blockage(30, 31).

2. Tomography: using radiographic is essential for a correct diagnosis of sinus disease. Common sinus tomography methods include computer tomography (CT-Scan), panoramic radiography, ultrasound tomography, Water's radiology, X-ray radiography, nuclear medicine and auxiliary diagnostic methods such as culture of nasal and sinus secretions(10, 32-36). Considering the importance of the paranasal sinuses tomography examination, the procedure will be explained separately in detail later. It should be noted that auxiliary diagnostic methods are which will be helpful in providing the correct diagnosis by getting helped with physical examination and radiography methods. This and many other methods are not still routinely used and some of them have only research purposes: for example, nasal and sinus cultures: the culture of nasal discharge has relatively low value (because of the pollutants with foreign origin). But if sinus culture be done of purulent secreting out of the sinuses entrance, the result can be partly trusted. The culture will be valuable, if the aspiration of maxillary sinus secretions be done, (aspiration is done under local anesthesia by syringe)(37).

- Computerized tomography: CT-Scan or computer coronal axial users are non-invasive methods are used to check the sinuses. In cases of unilateral sinus disease, to compare it with its other side, these images can be very helpful, and as the standard method is used to definitively diagnosis of acute sinusitis(38, 39).
- Panoramic Radiography: In this type of tomography vast area of the upper and lower jaw, or both are examined. The most common approach is pan tomography. In this type of radiography, radiographic and brands are often studied(32, 33).

- Ultra-sound imaging: Recently, the use of ultrasound in the maxillary sinuses study has conventional. This method is for distinguishing normal sinus-chronically inflamed sinus-and sinus which is filled by liquid or tumors, and will be helpful in diagnosis of scar tissues existed in the sinus as well(35).

- Water's radiography: sometimes is used to study the maxillary sinus. Sensitivity of this technique in the detection is low in compression with tomographic methods but its morbidity is lower than tomography(10, 40).
- X-ray radiography: In radiography, maxillary sinuses have a perspective same as that in paranasal sinuses, a cavity filled with air and covered by mucosal membranes. So it's observed, in radiography, as a regional radio Lucent with radiopaque with thin and elegant walls. The sinuses are small at birth. At this time these sinuses are containing a jelly-like substance. So in terms of radiography the sinuses are not observed until the 5 years old and there is not enough clarity(36, 41).
- Nuclear Medicine: Diagnosis of inflammatory diseases, coronary sinus and neo-plastic can be performed with this method. This method is also not commonly used(33, 42).

Cephalometric studies and more specifically radiographs of the maxillary sinus in the population have shown that the shape and size of the maxillary sinuses can vary by age and person. Even shape and size of sinus in a person's face on both sides may not be symmetrical and be different. So in this case the sinus bilateral comparison should not be made. Sinus bed to the nasal cavity floor is different at different ages. The sinus cavity may be divided to smaller houses by the perpendicular trabeculae that these features of sinus can be seen on the intraoral periapical radiographies, which should be considered(43-47).

In addition, in the sinus anatomy there are factors such as the deadlock of the sinuses inside, bone nodules, foreign bodies, cysts, teeth roots and the buds, nutritional channels of sinus wall, maxilla zygomatic appendage and lacrimal duct must be considered(18, 48-51).

To overview maxillary sinuses and their pathological changes, mainly extra-oral specific radiographies are used. In this type, image capturing is extensive.

1. Normal sinus tomography: This method is used to observe and investigate four paranasal sinuses(52).
   2. Sinus posterior - anterior radiography: also called occipital-mental and waters, is the main method to investigate the maxillary sinuses. The purpose of using this technique is to observing the maxillary sinus at the top of the granite ridge (Petrous) and its liquid level(18, 52).
   3. Caldwell's Radiography: it is also called occipital-frontal approach, is similar to the Waters method and purpose of its application is to check the status of frontal and ethmoid sinuses, and to investigate somewhat upper jaw sinuses as well(52).
   4. Bregma-Menton tomography: is used to evaluate distort between either central or lateral side of the lower jaw, sinus walls and zygomatic arches(52).
   5. Radiographic check of the sinus by injecting chamberlain substance: is performed by introducing an iodized material into the sinus or direct injection them in sinuses. With this method, investigation of masses inside the sinus and also estimation of inner sinus mucosal thick is possible. Of course, this method is not very applicable(53).
   Clinical **conditions**
   Pathological maxillary sinus association sinus with oral–dental system resulted from the functional and systemic connection between these two anatomical structures. Transfer of pathologic conditions from sinus to the oral-dental devices or vice versa forms through mechanical connection or is mediated by the presence of joint blood or lymphatic routes. It is estimated that 10-15% of pathological maxillary sinus diseases have dental origin(54).

Odontogenic sinus damages are expressed to the following statements:
1. Teeth-related pain of sinuses and vice versa Innervation origin (sensory) of upper jaw posterior teeth and maxillary sinus is the same. The signals are sent from the sinuses to the brain interprets as a toothache. Therefore, here the patient may complain of tooth pain. So in this case detailed examination and distinguishing dental and sinus pains is very important.
Local maxillary sinus pain is high around the eyes, cheeks, nose, upper teeth and upper lips, but maxillary sinus-associated pain is elevated in the posterior tooth area. There is also an inverse relationship. Because it often happens that the pain of a dental abscess confused with sinusitis. Some sinus malignant lesions may also cause manifestations such as pain, loosening of teeth, and gums bleeding(4).

2. Maxillary sinus opening to the oral cavity: oral cavity and the maxillary sinus normally do not have any direct connection. When the sinuses become connected to oral cavity due to any reason, it said oral-sinus fistula has created which could be for the following reasons:
1. Root swelling, abscess, and cysts or odontogenic granuloma in the root zone of upper jaw posterior teeth.
2. Excessive pressure during surgery
3. Development anomalies of upper jaw posterior teeth root which is necessary to radiographs be taken(22).
Treatment:
If the perforation (perforation) area be minor; in this condition usually mucosal membrane of sinus is undamaged and recover on its own.
The gums from two sides tooth cavity should immediately closer to each other by suturing, if the root apex tooth that must be pulled out is perforated sinus or perforation occurred during the procedure. Absorbable gelatin sponge can be used.
If the sinus perforation is broader, perforation should be immediately closed by flap surgery. It can be done by using palatal or buccal flaps (55-58).

3. Foreign bodies in the maxillary sinus:

Foreign bodies in the maxillary sinus are not a rare complication but because of the title of this article, those maxillary sinus foreign bodies will be discussed which are caused by teeth or at least have relation with them:

In the case of small foreign bodies in sinus, mucosal- ciliary system (mucociliary) help the sinus to drive spontaneously foreign bodies to nasal cavity. For example, materials that could be used for root canal obturation can be the case. Sinus large foreign bodies may also cause sinus infections, antrolith (maxillary sinus stone) and also create problems in diagnosis and treatment(25, 26, 59, 60).

-In Relation to the teeth roots that enter the sinus, the use of panoramic radiography is necessary. So radiological use to find the place of root and removed it with a small incision under the root mucosa or with an alternative via the dental cavity by using instruments such as gas, suction, and Forceps(11). If the root be in a position with weak access to it, one of two following ways can be done:
-Creating mucoperiosteal flop and piercing the maxilla in the area above the tooth cavity(61).
-Creating a hole in the canine fossa (Caldwell-Lac surgery) which is more applicable because a larger view(28).

4. Odontogenic sinus infection:
Maxillary sinusitis is sinus lining mucosal membrane inflammatory changes and it is susceptible for inflammation in adults more than the other. The infection is caused by various factors including, direct spread of dental infections, cold, flu, xanthomatosis diseases, and spread of infection from other paranasal sinuses and sinus traumatic injuries(62).

Maxillary sinusitis caused by dental infections is largely depends on connection and anatomical proximity of upper jaw posterior teeth and these sinuses. Microorganisms that cause maxillary sinusitis with dental origin will be some types of dental microorganisms. Pathological relationship between the maxillary sinus and teeth is depends on not only very close anatomical relationship, but also their vascular communication(4, 11, 14-16, 63).

-	Sinusitis	has	divided	into	different	categories:
1.		Acute		sinusitis(64,		65).
2.			Sub-acute			sinusitis(64).
3.		Recurrent		sinusitis(66,		67).
4.			Chronic			sinusitis(68).
5.		Allergic		sinusitis(62,		69).
6.		Hyperplastic		sinusitis(70,		71).

Investigating the above as the given article is about dental infections.

- In 12-10% of maxillary sinuses infection have dental origin. This may be due to a periapical lesion become acute or a tooth pulling cause sinus perforation and converting a chronic sinusitis (dormant) to acute. In relation to the symptoms of sinusitis, sinusitis with dental origin secreting pus with very bad smell. As mentioned previously the resulting pain can be and/or localized and teeth located in that area may be painful(21).

In relation to the maxillary sinus sinusitis it is essential to note that if the patient does not remember the onset of symptoms, sinus disease with dental origin should be suspected. In general, maxillary sinusitis cure, dental includes medical and prevention courses care. Generally, an acute sinusitis treatment is not surgery but medical(23).

2. Sub-acute maxillary sinusitis: If sinusitis does not improve it becomes sub-acute sinusitis. In fact, 10% of acute sinusitis becomes sub-acute. Sub-acute sinusitis is actually an intermediate stage between acute and chronic sinusitis. In this case, sinuses look dark in Trans-illumination. Since residual disease is not common, bacterial agent is also unusual and therefore is necessary to be detected and, nasal discharge so cultured is crucial.

- As the possibility of the disease spread to the bones is exist, sub-acute sinusitis should be treated even intense and stronger than the acute phase. Sinus punctures are the best and most useful therapeutic approach in sub-acute sinusitis(23).

3. Recurrent maxillary sinusitis: usually occurs in some patients with the common cold incidence. In these patients one should try to discover the disease-causing agents and eliminate them(23, 67).
4. Chronic maxillary sinusitis: it said to be chronic sinusitis, if the maxillary sinus mucosa change is permanently and irreversible. Dental chronic infection can trigger chronic maxillary sinusitis. In pathologic manifestations of this type of infections, soft tissues become irreversible. Thicken Sinus mucosal darkening and of radiographic in radiographic images are abundant; in this cases central region of the sinus is more transparent and its periphery looks opaque which in fact is a result of sinus mucosal thickening(23).

Infections inside the eye socket, ear and, pulmonary are complications related to chronic sinusitis. Chronic sinus inflammation may be spread to the upper alveolar nerve and even to all maxillary nerve causing severe pain (neuralgia). Inflammation can be caused by a variety of microorganisms. If the main cause be dental then surgical treatment is necessary where the most common method for surgery is Caldwell-Luk(36).

5.		Other	odontogenic		sinus		damages

a. Dental cysts: the most common foreign cysts to invade the sinuses have dental origins. Most of these cysts are of radicular and dentigerous.
- Radicular cysts (Rooty): This is one of the most common periapical lesions. If these cysts occur in upper jaw, they can gradually expand and invade into the maxillary sinus. Therefore, development of or antral fistula after tooth extraction is likely. But most of these cysts are causing bulging of sinuses floor and create a geodesic form.
- Dentigerous cysts: These cysts are associated with erupted or vegetative teeth. The incidence of these cysts in the upper jaw is much rare than the lower jaw. But if it does, it is more associated with dormant teeth like third molar. Usually radiolucency can be seen on radiographic images, if cysts develop into the sinus which in case, make bulging sinus wall or floor(72, 73).

B. Dental granuloma: granulomas are in fact the vegetative meaty tissue, which are formed in teeth root terminal by chronic inflammation. Like original cysts, these granulomas can cause sinuses floor bulging. Neoplasia: The sinuses and teeth neoplasia can create an interaction between these two anatomical structures. If serious injuries as adenocarcinoma, Osteosarcoma, fibrosarcoma, lymphosarcoma and etc madein sinus, it can cause reactions including pain, gums bleeding, and teeth loosening(22, 48, 74).

Treatment

There are many surgery-associated treatments for cysts and granulomas treatment such as, Marsupialization (Opening cyst entries and suturing its lining mucosa to the mouth, until when ossification is gradually make it eliminated) and Enucleation (complete removal of the lesion)(48).

6. effects sinus floor on orthodontic movement of maxillary teeth: The study was conducted on patients has been shown that teeth in which the ridges of the sinus bed have more deep, orthodontic Tipping (deflection) movement with 10 degrees maximum angle is more while in individuals with more horizontal and regular sinus bed, bodily movements are significant(11).

Discussion

Different studies show that one of the major causes of maxillary sinusitis is related to upper jaw posterior teeth infection. This is because of the close anatomic relationship between molar and premolar teeth structures with maxillary sinus floor. So strict examination is necessary to determine the cause it before treatment processes related to sinus and posterior teeth complications. Here we tried to, with a focus on dental cause, its diagnosis methods, and ultimately its treatment, mention different causes of maxillary sinus infections. According to importance and treatment association with correct diagnosis method and different pandemic of the disease among nations and diverse nationalities or communications with different cultural, economic, and social situations and or varieties of age ranges, a compression check is suggested be perform. Therefore, a reliable treatment method can be used. Epidemiological investigation allows the correct procedures be used as well.

Among nations and diverse nationalities or communications with different cultural, economic, and social situations.

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The effect of self-care education program on wound healing in women undergoing cesarean section

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Abstract

Introduction: Pregnancy and childbirth are exciting and important natural physiological processes in the lives of women and their families. Cesarean section (C-section) is one of the most common surgeries. Due to the role of self-care behaviors in acceleration of ulcer healing the present study was carried out in order to specify the effect of self-care education program on cesarean wound healing among women undergoing cesarean section.

Materials and methods: The present study was a semi-experimental clinical trial including 72 women who had undergone C-section and had inclusion criteria. The participants were randomly and constantly assigned into an experimental group and a control group. The experimental group was provided with educational booklets that were on taking care of surgical wound and improving pain and included hints on the type of nutrition, hygiene instructions, how to change dressings, and the type of prescribed activity. The content of the booklet was taught to the experimental mothers in a session of 45-60 minutes using the direct method of face-to-face teaching by the researcher. The mothers' learning level was assessed using a pretest and a posttest two weeks after the study in the clinic. Cesarean wound healing before the intervention and nine days after it was examined using REEDA tool. The collected data were analyzed using variance analysis and chi-square test through SPSS 20.0.

Results: The two groups were not significantly different in terms of their demographic characteristics. The mean score of cesarean wound healing 24 hours after the surgery in the experimental group and the control group was respectively 1.39±1.39 and 1.92±1.60, which showed no significant difference (p-value=0.135). After 9 days, the score of wound healing in the experimental group and the control group was respectively 0.53±0.65 and 1.43±1.28, which showed a significant difference (p-value<0.001).

Conclusion: Therefore, it can be concluded that the role of implementing the educational program in enhancing the level of self-care of cesarean wound was positive, and it seems that implementing such programs can accelerate wound healing.

Keywords: self-care, wound healing, education, cesarean section.

Introduction

Pregnancy and childbirth are exciting and important natural physiological processes in the lives of women and their families (Fisher, Hauck & Fenwick, 2006). Cesarean section is one of the most important surgeries in obstetrics and gynecology (Osterman &Martin, 2013). Nowadays, due to different causes such as a rise in marriage age, legal issues in obstetrics wards, and socioeconomic conditions of the society, C-section is one of the most common surgeries (Cunningham et-al, 2014). Over 1 million C-sections are carried out in the USA every year (Martin et-al, 2013). In our country, the statistics of C-section has risen in state and private centers in recent years, such that it is ranked as the fourth country in terms of the rate of C-section cases, following Brazil, Cyprus, and Colombia. This rate was 46% in 2014. The statistics published by the World Health Organization; however, reported the global standard of C-section in 2014 as 5 to 15 %(MacDorman, Menacker & Declercq,2008). C-section is a highly hazardous surgery for the mother and the fetus, which can increase the mortality rate of the mothers and infants (2-4 times more than natural childbirth) and enhance complications such as infection, bleeding, and emboli, such that the rate of incapability caused by C-section is 5 to 10 times more than natural childbirth [Moayed&Sohrabi, 2011]. Inadequate wound healing and formation of rupture in surgical incision are among main causes for complications after C-section (Festin et-al, 2009). The complication of wound after C-section is a big problem which can occur even if correct surgical hints are taken into consideration. Although entrance of the least trauma to the tissue, decrease in use of cautery, consideration of disinfection tips, sufficient preparation of the skin before the surgery, and use of appropriate surgical techniques play an important role in reduction in wound infection, wound infection (Surgical Site Infection)[i] is one of the most common types of hospital infection which is associated with hematoma, serous, and dehiscence and is also one of the most common causes of mortality after C-section (Clay et-al, 2011; Samadi et-al, 2009).It results in hospitalization of the mother and her frequent reference to the doctor and imposes great economic and emotional on the families and the society (Pallasmaa et-al, 2010).It also leads to emotional separation between the mother and the infant (Samadi et-al, 2010). Therefore, wound healing is the main purpose of postsurgical cares. Wound healing is the corrective coordinated response to tissue and starts after the surgery and leads to tissue restoration (Campos, Groth & Branco, 2008). Wound healing includes coordinate measures that lead to the restoration of the tissue. Restoration process, apart from the causes of wound, occurs in all ulcers (Campos et-al, 2008). Skin ulcer restoration takes place over 3 phases: inflammation, proliferation, and tissue maturation (Dahan, Fennal & Kumar,2008).Individual factors including age, activity level, nutrition status, medicines, psychological status, and positive attitude are effective in wound healing process (Benbow, 2011). Self-care includes learned purposeful informed activities and measures taken by the individual in order to maintain the life and provide, save, and enhance one's health and family. The effect of self-care measures on improvement of health complications and decrease in costs has been proved in different studies (Werch, 2013). Promoting self-care behaviors can help patients control their life and adapt themselves to the complications of their disease, and this adaption leads to improvement of the quality of their life (Jarsma et-al, 2000). Playing self-care role and the patient's participating in treatment are among factors that affect improvement of life quality (Werch, 2013). Self-care in diseases can reduce the use of health care system resources to a large extent, such that it leads to a decrease of 40% in reference to general physicians, 17% in reference to specialist physicians, 50% in hospitalization, and 50% in work absenteeism. The most important purpose of educating self-care to patients undergoing C-section is to reduce the complications caused by the surgery, to decrease mortality rate among such patients, and to manage disease using a self-care training approach (Moulton et-al, 2015). Therefore, formation of self-care in patients requires systematic educational and supportive interventions in order to manage health problems by the health practitioners including nurses (Werch, 2013).Due to the nurses' key role in training self-care behavior, specifying behaviors that accelerate the wound healing process includes guidance in order to develop nursing intervention better (laluei et-al, 2009). Therefore, according to the results of different studies and given the fact that the effect of self-care program on C-section site wound healing has not considered in any studies and because there are numerous reports by gynecologists and relevant authorities on the prevalence of complication relevant with surgical incision in C-section patients and also their unawareness about how to carry out self-care about the relevant surgicalincision, the present study was carried out in order to examine the effect of self-care educational program on wound healing and the pain acuity in women undergoing C-section.

Materials and methods

The present study a semi-experimental clinical trial that was carried out over March to September 2016 in Sarpol-e Zahab Hospital, Kermanshah after permission was received from the Ethics Committee of Iran University of Medical Sciences (IR.IUMS.1395921119647). Given α=0.05 and the power of 90%, the sample size was estimated as 72 individuals (36 in each group). The inclusion criteria included: being primiparous and

multiparous (with the experience of C-section in last two years), age range of 18-35 years, pregnancy age of 37-42 weeks, reading and writing literacy, having no visual, hearing, or tactile problems, not having BMI of >30, cross-lower uterine incision and Pfannenstiel incision, not using drugs affecting improvement and wound scar, and not being addictive to any drugs. In order to collect the required data, after obtaining necessary permissions from authorities and written informed consent from the participants, the researcher started collecting the required data. In so doing, by taking into account the inclusion criteria, the researcher selected the mothers, and after obtaining informed consent from them and explaining the confidentiality of the study, and before childbirth the researcher assigned the participants randomly into an experimental group (self-care group) and a control group. In so doing, the first two participants with the inclusion criteria were randomly assigned into one of the two groups, and this procedure was employed until the desired sample size was achieved. In order to examine the wound healing, REEDA tool was used which works based on the criteria of redness, swelling, bruising, ulcer exudates, and Agglutination of wound edges. Twenty-four hours after C-section (before the intervention) when the ulcer dressing was changed for the first time, the researcher used the REEDA tool, which was in the form of a graded paper tape, to measure the healing rate of the wound. Afterwards, the researcher taught the wound care booklet to the experimental mothers, including hints about the type of nutrition, hygiene instructions, how to change dressings, and the type of activity. This face-to-face teaching session lasted 45-60 minutes. The participants' rate of learning was tested before the study and two weeks after it in the clinic. The reason for administering the pre- and post-tests was to make sure about the information transfer to the patients and to prevent learning bias. In the end of the session, the booklets were given to the experimental group. The control group only received routine care measures of the hospital. Nine days after the intervention (on the 10th day after the C-section), the participants were required to have their coded cards with themselves while referring to the clinic for extracting the sutures and examining the pain acuity in the mentioned area in order to remind the participants and the report forms according to the hospital's routine. The exclusion criteria included lack of willingness to participate in the study, absence in the training session, the participant's failure to refer weekly, use of drugs or other ways to improve the wound, and incidence of any kind of infection in the area which required treatment. The collected data were analyzed through Chi-square test and variance analysis using SPSS 20.0. Non-parametric tests of Kruskal-Wallis and Friedman were also employed.

Results

Seventy-two women who had undergone C-section entered the study. They were randomly assigned into an experimental group (n=36) and a control one (n=36). There was no significant difference between the two groups in term of their mean age (27.61±3.85 and 29.32±12 years, p=0.071). Moreover, there was no significant difference between the two groups in terms of their demographic characteristics including education, occupation, economic status, mothers' health education, and BMI (p>0.05) (See Table 1).

Table1. Absolute and relative frequency distribution of the participants based on their demographic characteristics

Demographic	Group	Experimental Group	Control Group	Sig.
Mother's Age		27.61 ± 3.85	29.32 ± 4.12	0.071
Mother's Educational Level	Elementary or Intermediate	18(49.9%)	21(50.1%)	0.436
	High School or Diploma	15(41/7%)	10(27%)	
	University	3(8/3%)	6(16/2%)	
Mother's Occupation	House Keeper	36(100%)	33(89/2%)	0.115
	Working	0(0)	4(10/8%)	
Mother's Working in Healthcare Centers	Yes	1(2/8%)	2(5/4%)	0.999
	No	35(97/2%)	35(94/6%)	
BMI	18.5-25	2(5/6%)	1(2.7%)	0.738
	25-30	25(69/4%)	31(83/8%)	
	Over 30	9(25%)	5(13/5%)	
Economic Status	Good	7(19/4%)	3(8/1%)	0.262
	Average	15(41/7%)	14(37/8%)	
	Bad	14(38/9%)	20(54/1%)	

The mean score of C-section wound healing in the experimental group and the control group was respectively 1.39±1.38, which showed no significant difference between the two groups (p-value=0.135). Nine days after the

intervention; however, the mean score of wound healing showed a significant difference (p-value<0.001, See Table 2).

Table 2. Comparing the mean scores of wound healing of the participants based on day

Group Day	Experimental Group	Control Group	p-value (Independent t-test)
24 Hours after the Surgery	1.39 ± 1.38	1.92 ± 1.60	0.135
9 Days after the Intervention	0.53 ± 0.65	1.43 ± 1.28	≤0.001
Changes	-0.86 ± 1.38	-0.49 ± 1.79	

Discussion

According to the results of the present study, C-section wound healing 9 days after the surgery can be justified to a large extent using self-care compared to standard care provided by the ward. No studies has ever focused on the effect of self-care education program on healing of site C-section &; however, different studies have examined the effect of self-care on other fields. The results of the present study indicated that the mean score of C-section wound healing 9 days after the intervention in the experimental group was 0.53±0.65 which was lower than that of the control group (1.43±1.28). The results of the study carried out by Mahmoudi (2005), aimed at investigating the effect of self-care on foot ulcer in diabetic patients, showed that self-care plays a significant role in treating and preventing the complications of diabetes, which is in line with the results of the present study. Jalilian et al (2012) carried out a study with the purpose of examining the effect of educational program on increase in self-care among the patients with type 2 diabetes. The results of their study indicated that implementing self-care program plays a significant role in treating and preventing the complications of diabetes. also The results of the study carried out by Abbas poor et al (2013), aimed at investigate self-care behaviors of the foot in diabetic patients showed a statistically significant relationship between self-care behaviors and score as many points was a foot ulcer and peripheral nervous system involvement. (P = 0.042).Although that study focused on the effect of self-care on diabetic ulcer which is chronic, the results of that study is in line with those of the present study.The results of the study carried out by Ghotbi et al (2013), dealing with the effect of educating self-care behaviors based on the model of family-centered empowerment in diabetes type 2, showed that such behaviors in type 2 diabetic patients lead to enhancement in self-care also Raman (2015), carried out a study with the purpose of compared to investigate self-care and care aseptic wound healing episiotomy showed a significant relationship between episiotomy wound healing and self-care. (P <0.05), although the wound is different but the results of the research study is consistent with our findings.

Conclusion

The results of the present study showed that training self-care is effective in acceleration of C-section wound healing. According to the results of the present study. Implementing educational methods with the patient's participation and centeredness can play an important role in adopting correct health behaviors and cause the patient to obtain independence in her care. Moreover, the results showed that using self-care models in health policymaking can play an important role in an increase in the society's health level.

Acknowledgements

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The Effectiveness of Narrative Therapy on Reducing Marital Conflicts

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Abstract

Purpose: Adjustment is regarded as a basic psychological need which is being mostly studied in clinical and social psychology. The present research aims at studying the effectiveness of narrative therapy on reducing marital adjustment and its scopes on married teachers of Jooyam Department of Education.

Methodology: This is a semi-experimental study conducted on 80 women who were selected by purposive sampling and then they were randomly assigned to experimental and control groups. First, both groups` level of couples` marital adjustment was assessed by the marital adjustment questionnaire of Graham Spanier in pre-test stage. After the intervention, the experimental group was provided by 8 treatment sessions and after that both groups were given the questionnaire again (post-test). The research data were analyzed by descriptive statistics and covariance analysis.

Findings: The research results showed that narrative therapy has reduced marital conflict and its components (marital satisfaction, marital solidarity, mutual agreement and affection expression) in the experimental group and that there were significant differences between the control and experimental groups.

Conclusion: Regarding the present research findings, the study on the effect of narrative therapy on reduction of marital conflicts can provide worthy implications for mental health of couples. The research results and implications will be discussed in the present article.

Keywords: Narrative therapy, marital adjustment, Scopes of adjustment

Introduction

Family is regarded as the key institution of any society. It is one of the groups that can meet human mental, emotional and financial needs. It is the most valuable and effective institution among other social institutions and is considered as the most pervasive and comprehensive social unit and the normality or abnormality of any society depends on the general conditions of families because all social problems are influenced by family (Navabi Nezhad, 2007). Nowadays, the main reasons for marriage and the mutual expectations of couples have been changed considerably. The main reasons for marriage are need to love and affection and satisfying emotional-mental needs. On the other hand, marriage leads to the emergence of cooperation, compassion, interest, kindness, tolerance and responsibility towards the family (Butt, 2005). Marital adjustment can be defined as a process in which there are different implications such as difficulty in understanding gender differences, personal and interpersonal anxiety, marital satisfaction, etc. (Spanier, 1976). Marital adjustment is a situation in which couples often feel happiness and satisfaction. This can be regarded as the base of family`s good performance and it is the most important predictive factor for the mental health of married people (Erfanmanesh, 2009). Marital adjustment can be achieved by mutual love, care for one another, acceptance, understanding and satisfying the needs of each other (Sinha & Mukerje, 1991). Conversely, marital conflicts and divorce increases the risk of depression, suicide and physical illnesses in adults. Also more than others, their children are prone to anxiety and behavioral and health problems (German & Frankel, 2000). The most important issue in any marriage is marital adjustment. The couples` adjustment is a successful implication which not only affects the couples` level of satisfaction and happiness, but also reduces marital conflicts. Marital adjustment means that couples are ready to change themselves in some aspects and to ignore some of their needs in order to meet the needs of their spouse. This is because it is normal for couples to have some differences and such differences are followed by special moral and behavioral characteristics which are exactly the opposite of the other party desires. In marriage, couples should attempt to recognize characteristics, desires and the level of sensitivity of each other and be aware not to do anything to stimulate the sensitivity of their partner (Ebrahimi Pisheh, 2010).

As Harvey (2005) suggests, 10 % of couples will get divorce within 5 years after their marriage and 20% of them get divorce within 10 years after their marriage. Divorce is regarded as the most reliable index of marital conflict and has recently become epidemic in western societies and even in our society. However, the high rate of divorce only shows one aspect of the total population of couples who have communication problems. Other couples often have serious communicative problems which affect their adjustment as well as their process of life. But they decide to continue to live with each other for reasons such as financial problems of divorce and cultural individual ideas toward divorce. Generally, statistics obtained in recent decades since 1980 have reported that the probability of finding happiness in marriage and its permanence is

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desperately low (Gordon & Durana, 2011). Many couples who seek for mutual treatment considerably lack the main communication skills (Johnson, 2005) and as Harvey (2005) states, nothing can improve couples` relationships and interactions than creating and maintaining intimacy.

Among the issues that marriage counselors are facing with, are problems related to adjustment in couples` relationships and helping them improve and reduce their conflicts. Creating and maintaining intimate relationships and satisfying the couples` emotional and mental needs is considered as an art, which in addition to mental health on primary healthy experiences, it requires having or obtaining logical attitudes, communicative skills, life skills and doing one`s duties, all of which require training and practice. Human beings have long been faced with numerous questions regarding the importance of marital adjustment in health of family members, their balance and the significance of successful happy marriage which is the origin of marital adjustment and mental balance. As an example, which factors affect marital adjustment? What are the advantages of marriage for couples irrespective of observance of a religious duty, correct and permissible satisfaction of sexual instincts and liberation of loneliness? How they can avoid conflicts and so on. Many studies have been done to answer such questions. They contain many numerous findings that reveal variables, criterion and factors that affect marriage and marital adjustment (Karimi, 1998).

Various approaches exist in couple therapy each of which consider different aspects of treatment. Couple therapists have long been involved with the reliability, validity and efficiency of such approaches. One of these approaches is narrative therapy which is introduced by White & Epston (1990) which emphasizes on externalizing the couples` problems and proximity of couples` narratives. Literally, narrative means expression of events in terms of story. In most dictionaries, this word is being interpreted as story. However, as unreal events are often proposed in stories, it is better to use the word "narrative". In other words, in narratives we encounter realities which different people convey with their own style. Kelly (2000) believes that narrative is a structure we use in order to achieve meanings of different things. White (1990) has proposed a more comprehensive definition. He suggests that narratives are people`s statements about their experiences in their lives and that such statements are the outcomes of their interpretations; the interpretations by which they assign meaning to their life experiences. Such interpretations make them sensitive about themselves.

Narrative therapy deals with individual life stories concerning couples` relationships (Josselson, Lieblich & Mc Adams, 2007). Creating stories for important events of couples` relationships causes successful integration of intimacy issue within a positive emotional framework and finally, it is associated with couples` communicative and psychological welfare (Frost, 2012). Narrative therapy is regarded as one of the effective methods in the field of couples` treatment and it is used as a new approach towards the classic psychotherapy (Amundson, 2001). Nowadays, social psychologists use narrative methods (stating one`s life story and replacing stories with positive expressions) to test hypotheses related to the dynamics of close and intimate relationships in couples` relationships. Hereby, they improve family performances and their intimacy (Mouri & Holms, as stated in Skerret, 2010). In this approach, the bases of treatment are interpretations or meanings which people attribute to their life events. Understanding of interpretations which people have concerning their life events can limit or develop their possible proceedings. The narratives of therapists help referees to achieve wider unique interpretations about themselves, people and situations. These narratives cause changes in narrative therapy approach as an effective approach towards interpersonal relationships (Plgngurn, 2004). Based on the narrative therapy viewpoint, as much as the environment shapes us, we also shape the environment. Human creates a world by narration. Often, people do not understand their active roles. Because of this, we often hear that: "This problem always happens to me" (White, 1990; as stated in Naziri, Ghaderi & Zare, 2009). This approach will help members to create new stories for their lives. The present approach believes that the process of making new stories creates a personal necessity in members which enables them to better deal with their problems and conflicts in future (Gladding, 2013) and to achieve more intimacy in their relationships.

Narrative therapy sees people as the original specialists of their own lives and regards problems apart from people. This approach imagines that people already have many skills, abilities, beliefs and values all of which help them to reduce their problems. The most important concept of narrative therapy is that problem is problem and individuals or families are not problems. Narrative is a form of conversation which relates events over time, and let people to talk about their life story without being criticized even if it was wrong, and express his/her their emotional aspects. These conversations include externalization of their problems, achieving outcomes, highlighting new plans and relating them to past events (Fiese & Grotevant, 2001).

Marital adjustment can fully affect quality of life and recent studies have emphasized on the effect of this issue on different clinical results, such as mental health, physical health and even people`s longevity (Abbasi, Begian Koolemarz & Dargahi, 2015). This research revealed that by using principles of behavioral treatment, e.g. behavior exchanges, reinforcement of positive behavior, punishing couples` bad behaviors, modification of bad behavior and preventing formation of undesirable interactions and conflicts, therapists can improve marital adjustment in couples. Teaching life skills reduce marital conflicts (Shooraki, Amini & Rahmani,

2015). Shooraki, et al showed that therapists can reduce couples` conflict on the verge of divorce by teaching life skills to them and eliminating their restrictions and barriers.

In another research, Khodabakhsh et al (2014) studied the efficacy of narrative therapy approach on the couples` intimacy and its scopes. They realized that stories are formed via assigning meaning to life events and selecting special events and taking them into consideration. These stories can be rewritten and hereby improve people`s lives. In fact, narrative therapy helps patients to replace the preferred story with the problematic story. It can be expected that narrative therapy can have an essential role in reducing the couples` communicative and intimacy problems by looking at the couples` problems from the context in which they are located as well as by considering their social and cultural roles that affect their problems. Narrative therapy deals with formation of therapeutic alliance with the patient in order to achieve and improve their abilities concerning their relationships with themselves and others. This approach can help couples to improve their quality of interpersonal relationships and therefore, reduces interpersonal problems and increases couples` intimacy.

In addition, Ghavami et al (2014) analyzed the efficacy of narrative therapy on reduction of anxiety and self-esteem. They concluded that the purpose of narrative therapy is to make patients be aware of inefficient beliefs and changing them in a proper way, externalizing and weakening problems, creating an external look towards a problem from different perspectives and finally, creation of a different interpretation and writing a new story for the life narratives. Thus, people can achieve a new look towards realities by narrative therapy in order to reduce their unhealthy thoughts and attitudes towards themselves and the environment. Consequently, they can have more effective interpersonal relationships, increase their group and social interactions and develop interpersonal experiences in these groups and reduce negative factors like fear, anxiety, etc. Honarparvaran (2014) studied the efficacy of Acceptance and Commitment Therapy (ACT) on forgiveness and adjustment of females who were affected by their husbands` infidelity. She focused on discovering values of each couple by concentrating on what is really important and how a person creates a meaningful life for their marital life by using personal values. She highlighted couples` life experiences to help them discover ways of effective living. These women learnt that the meaning of life satisfaction is not reaching to whatever we want. Rather, it means that we should be satisfied with our experiences, accept them and encounter negative emotional situations.

Vromans & Schweitzer (2011) assessed the effect of narrative therapy on people`s anxiety and interpersonal relationships. They selected 47 adults and provided them with 8 treatment sessions.They showed 74% improvement in depression symptoms, 61% improvement in their performance and 53% clinical improvement. After treatment, they showed lower level of interpersonal improvement than depression symptoms improvement (d=0.62). Three months follow-up showed that these symptoms have remained the same. However, the interpersonal improvements have been changed. Metoos et al (2009) selected 10 people and divided them into two groups and provided them with narrative therapy sessions. One of the groups showed higher efficient outcomes than the other one. In both groups the therapeutic alliance was seen to varying degrees. The group which had higher efficiency could increase and maintain their new experiences. In the middle of their treatments they showed positive changes and they maintained their therapeutic alliance. However, the other group had less efficacy and most of them were absent in the fourth session.

Yancey (2007) analyzed the couples` marital adjustment and flexibility and showed the relationship between three variables of adaptable personality, rewarding experiences and social protection (that were effective in making flexibility) with marital adjustment. The research samples were 142 couples who were in the first stages of family life and they have passed 2-6 years of their marriage. Results showed that there were positive correlations between marital adjustment and personality variables and that there were positive meaningful relationships between personality characteristics, flexibility and marital adjustment. Etkins (2005) compared two educational programs in order to improve marital adjustment and communicative patterns in 131 couples. Their educational programs included teaching the traditional behavioral skills and teaching by emphasis on cognitive structures. They used Dyadic Adjustment Scale (DAS) and the communicative patterns questionnaire (CPQ) of Kristen and Salavi. Their findings indicated that both teaching methods could improve components of communicative patterns. However, teaching by emphasis on cognitive and emotional structures had more effect on couples` communicative patterns.

Totally, it can be said that identification of effective factors on improvement of marital relationships and their management is regarded as one of the considerable methods in solving couples` problems and achieving marital satisfaction. Therefore, identification of these factors not only help the couple therapist to diagnose their problems, but also help couples to create, improve or modify these factors and to achieve marital adjustment, satisfaction and intimacy. In addition, the importance of conducting such investigation is that there are increased rate of divorce annually. Also, the undesirable effect of communicative problems on couples` lives and their children, the necessity to find effective ways to reduce implications and to improve the improper relationships between couples, seeking new fields of study concerning marital conflicts and problems to be used by family therapists and scholars, are among factors that show the significance of such

study. Also, it is predicted that the efficacy of this approach and raise awareness of the families of the patients and family planners also revel the necessity to run this investigation. Thus, the purpose of the present article is to answer the following questions:

1- Whether the narrative therapy approach significantly reduces marital conflicts and its scopes?
2- Whether the efficacy of narrative therapy is constant on reduction of marital conflicts and its scopes over time?

Methodology

The present study is experimental and uses pre-test, post-test and follow-up stages in the experimental and control group.

The research populations are 80 married women who were teachers in Department of Education of Jooyam district. They participated in the project in the spring 2016. The authors first referred to Department of Education of Jooyam district and talked about their project with relevant authorities and received their approval. Then, they did the necessary arrangements with the intended girls` school. Over time, the researchers met the sample members and talked to them about the research purposes and the way of answering to the questionnaire and invited them to cooperate in the project. The researchers conducted a purposive sampling: they randomly selected 5 schools out of 8 girls` schools. Then, all married teachers of those schools were given DAS marital adjustment questionnaire in pre-test stage. Afterwards, 30 people were randomly selected out of those who had low scores. Then, those who scored lower than 38, had at least the associate degree, aged 20-40 and were inclined to participate in the project were selected and were randomly assigned tothe experimental and control groups. The experimental group participated in 8 sessions of narrative therapy (each session lasted 90 minutes). After these sessions, both groups were given DAS questionnaire (post-test stage) and researchers compared their marital adjustment in post-test and pre-test. They also compared the lasting effects of treatment within 2 months (follow-up stage). The independent variable of the present study was narrative therapy and the dependent variable was marital adjustment. For data analysis descriptive statistics (mean and standard deviation) and inferential statistics (analysis of variance and ANOVA one way) were used. To respect the research ethics, patrons were told that in addition to the usefulness of this intervention for them, thesesessions are part of an investigation. Also, they were told that items that are discussed in sessions will not be shared with anyone else without their consent and they will remain anonymous. Because many teachers had low scores, it was not possible to select all of them. So, a group session was held to teach marital skills to these women. For further assistance, the free counselling center of socio-cultural department of Shiraz Municipality was introduced to them. After the experimental group spent the sessions and the follow-up stage, the control group also was provided by similar sessions. The independent variable was group training based on narrative therapy approach and the dependent variable was marital adjustment and its scopes namely marital satisfaction, marital solidarity, mutual agreement and affection expression. There were 8 treatment sessions (2 times a week, each lasted 90 minutes) for the experimental group. The content of these sessions was based on the narrative therapy theory and the existing texts were designed and implemented as follows. Then, both groups were given the post-test.

The first session:
a- The introduction of the therapist and the client and getting to know each other,
b- Assigning the treatment purposes,
c- Creating a sense of commitment in the patients towards treatment,
d- Assigning the clients` expectations towards treatment and the way it is handled,
e- Creating hope and positive attitude in the patient towards treatment by presenting positive samples that have been treated previously.

The second session:
a) A review of the previous session,
b) Summarization (retelling the clients` sayings) at the beginning and end of the next sessions,
c) Asking the patient to explain his life events in form of a story,
d) Helping the patient to divide her life events into different chapters and naming them,
e) Asking her to write her life story and present it to the therapist for the next session.
f) Summarization.

The third session:
a- A review of the previous sessions,
b- Summarization,
c- A review of the written story which is set out by the therapist,
d- Discovering and analyzing significant and affective memories,
e- Analyzing the sample`s grief
f- Discovering and analyzing the excitements associated with these memories
g- Discovering and analyzing the patient's feelings towards the people in those memories.

    h-   Summarization.
The fourth session:
 a- A review of the previous sessions,
 b- Summarization,
 c- Discovering big problems by the clients and splitting the history of the problem which has shaped the lives of family members.
 d- Naming the problem by asking help of the clients themselves,
 e- Exteriorizing the problem and attempting to deconstruct by using unique results.
 f- Exceptional questions and metaphors.
 g- Permanent use of exteriorization and metaphors during the therapy sessions.
 h- Summarization.
The fifth session:
 a- A review of the previous sessions,
 b- Summarization,
 c- Asking the client to define a new story for his life.
 d- Asking the client to write this story and deliver it to the therapist to use it in the next sessions,
 e- Summarization.
The sixth session:
 a- A review of the previous sessions,
 b- Summarization,
 c- Continue to analyze the new story
 d- Using external witnesses such as wife, children and other important people in the patient`s life to overcome dogmatism when the therapist thought it was necessary,
 e- Helping the client to set out a new story based on reality,
 f- Deconstruction and challenging the dominant negative narratives,
 g- Using unique results to improve and create new motivations to present positive and different ideas,
 h- Summarization.
The seventh session:
 a- A review of the previous sessions,
 b- Summarization and using external witnesses if necessary,
 c- Reminding the new story,
 d- Analyzing the story by the help of the client in new situations and analyzing the environmental feedbacks,
 e- Analyzing the patient`s capabilities in the new situations which occur based on the new story,
 f- Analyzing the changes which occur in the patient`s life based on the new story and stating its positive effects by the help of the patient,
 g- Summarization.
The eighth session:
 a- A review of previous sessions,
 b- Summarization,
 c- Ensuring that the new story is rich enough to support the client and his/her future,
 d- We can manage to have a happy atmosphere in the last session,
 e- The envelope written by therapist is given to the patient. This envelope contains important points of the therapy sessions and new changes have been included in it.
 f- Running a test and determine the date of the follow-up session.
.During the research on the experimental group, their wives were also called to attend the sessions in order to improve the process of therapy. The present research used the following tool to collect data:

DAS marital adjustment questionnaire: This questionnaire includes 32 questions to evaluate the quality of couples` marital relationships. This tool can be used to assess overall satisfaction in an intimate relationship. Factor analysis shows that this scale assesses 4 scopes: mutual satisfaction (the level of satisfaction of various aspects of one`s relationship), mutual solidarity (the level of participation in joint activities), mutual agreement (the level of mutual agreement in a marital relationship issues such as finances, child upbringing, etc.) and affection expression (Sanaei, 2000). Spanier (1976) has estimated that the validity of this scale in the total scores is 96%. This shows that this scale has a significant sign of internal consistency. The internal consistency estimates that validity of subscales also range from good to excellent: 94% for marital adjustment, 81% for marital solidarity, 90% for mutual agreement and 73% for affection expression. In addition, Spanier (ibid.) reported that the content and construct validity of this scale is desirable. In order to determine the reliability of the questionnaire, Haj Abol Zadeh (2002) run this questionnaire on 15 couples with an interval of one week. The correlation coefficient between scores of males and females (after 2 times adoption of the questionnaire) was totally 81%. Also, as to the subscales, the correlation coefficient was 68%

for marital satisfaction, 81% for marital solidarity, 77% for marital agreement and 78% for affection expression. Scoring in this questionnaire is in a way that each item receives a score 1 to 5 based on its instruction. The higher the score of a person is, the better is the couples` adjustment.

Findings
Descriptive findings

Table (1) the statistical indices of marital adjustment and its components in the control and experimental groups in pre-test, post-test and follow-up

Variables	Test	Experimental group			Control group		
		Mean	Standard deviation	Number	Mean	Standard deviation	Number
Marital adjustment	Pre-test	46/87	14/22	15	39/00	8/16	15
	Post-test	78/93	19/74	15	38/21	6/41	15
	Follow-up	71/50	22/10	15	31/93	6/08	15
Mutual satisfaction	Pre-test	25/20	4/41	15	19/60	4/21	15
	Post-test	29/07	7/37	15	19/40	3/81	15
	Follow-up	26/79	8/16	15	16/33	3/87	15
Mutual solidarity	Pre-test	7/40	2/64	15	6/07	1/75	15
	Post-test	13/33	3/85	15	5/67	1/54	15
	Follow-up	11/73	4/20	15	4/73	0/70	15
Mutual agreement	Pre-test	11/27	7/63	15	10/07	2/66	15
	Post-test	29/27	11/70	15	10/20	2/68	15
	Follow-up	27/53	11/08	15	8/13	1/85	15
Affection expression	Pre-test	3/00	1/73	15	3/27	1/75	15
	Post-test	7/27	1/75	15	3/21	1/42	15
	Follow-up	6/40	1/88	15	2/73	1/44	15

In assessing MANOVA, as the linear combination of variables in the regression equation is being analyzed, it suffices to include differences between variables (difference between post-test and pre-test or Follow-up and post-test) and adding the third variable (difference between follow-up and post-test) does not create and meaningful differences. **As can be seen in table (1), the mean of marital adjustment and its components is increased in post-test for the experimental group. However, such difference is not significant in the control group.**
Inferential findings
Before conducting the covariance analysis, the authors managed to exclude any interaction between the independent variable (group), covariatevariable (pre-test) and dependent variable (post-test). These results are presented in Table (2).

Table (2) the interaction test between group and pre-test with post-test of marital adjustment and its components in the post-test

Variables	Sources of changes	Sum of squares	Degree of freedom	Mean of squares	Test statistic	p
Marital adjustment	The interaction effect of pre-test and group	19/10	1	19/10	0/13	0/726
Mutual satisfaction	The interaction effect of pre-test and group	62/09	1	62/09	2/06	0/163
Mutual solidarity	The interaction effect of pre-test and group	0/21	1	0/21	0/04	0/846
Mutual agreement	The interaction effect of pre-test and group	15/36	1	15/36	0/34	0/566
Affection expression	The interaction effect of pre-test and group	2/23	1	2/23	1/33	0/26

As it can be seen in Table (2), there are not any significant relationships for all the research variables (p>0/01) and this condition is established for covariance analysis that the slopes of the regression lines should be paralleled. Therefore, we use covariance analysis test to analyze the effectiveness of narrative therapy based teaching on marital adjustment and its components on married woman.

Table (3) the interaction test between group and pre-test with post-test of marital adjustment and its components in the follow-up stage						
variables	Sources of changes	Sum of squares	Degree of freedom	Mean of squares	Test statistic	p
Marital adjustment	The interaction effect of pre-test and group	32/43	1	32/43	0/13	0/722
Mutual satisfaction	The interaction effect of pre-test and group	50/71	1	50/71	1/43	0/243
Mutual solidarity	The interaction effect of pre-test and group	0/01	1	0/01	0/00	0/982
Mutual agreement	The interaction effect of pre-test and group	0/81	1	0/81	0/01	0/908
Affection expression	The interaction effect of pre-test and group	0/72	1	0/72	0/26	0/613

As it can be seen in Table (3), none of the variables show a significant relationship in their interaction test between group and pre-test with post-test of marital adjustment and its components in the follow-up stage (p>0.01) and this condition is established for covariance analysis that the slopes of the regression lines should be paralleled. Therefore, we use covariance analysis test to analyze the effectiveness of narrative therapy based teaching on marital adjustment and its components on married woman.

The first research question: Does narrative therapy has any significant relationships on marital adjustment and its components?

In order to answer this question, covariance analysis was used. These results are presented in Table (4).

Table (4) results of covariance analysis of narrative therapy on marital adjustment and its components in post-test							
Components	Sources of changes	Sum of squares	Degree of freedom	Mean of squares	Test statistic	p	Eta
Marital adjustment	The effect of pre-test	2157/32	1	2157/32	14/63	0/001	0/36
	The effect of independent variable	7779/97	1	7779/97	52/76	0/000	0/67
Mutual satisfaction	The effect of pre-test	119/42	1	119/42	3/82	0/061	0/12
	The effect of independent variable	251/82	1	251/82	8/05	0/009	0/23
Mutual solidarity	The effect of pre-test	97/96	1	97/96	18/54	0/00	0/41
	The effect of independent variable	294/20	1	294/20	55/66	0/000	0/67
Mutual agreement	The effect of pre-test	818/24	1	818/24	18/46	0/000	0/41
	The effect of independent variable	2383/29	1	2383/29	53/75	0/000	0/67
Affection expression	The effect of pre-test	25/17	1	25/17	14/83	0/001	0/36
	The effect of independent variable	131/30	1	131/30	77/38	0/000	0/75

As it can be seen in the above table, there are significant relationships in the effect of independent variable of marital adjustment and its component in the post-test stage (p<0/01). Thus, there are significant differences between the mean of marital adjustment and its components in both control and experimental groups at the post-test stage and after omission of the pre-test effect. Also, narrative therapy shows meaningful differences on marital adjustment and its components in the post-test stage. The extent of such effect, as the square of Eta coefficient suggests, is 67% for marital adjustment, 23% for mutual satisfaction, 67% for mutual solidarity, 67% for mutual agreement and 75% for affection expression.

Conclusion

Results of Table (4) revealed that there are meaningful differences between the mean of marital adjustment of the control and experimental groups. Therefore, the first research hypothesis will be approved. In other words, it can be concluded that narrative therapy reduces the experimental group`s conflict and has positive effects on its components (marital satisfaction, marital solidarity, mutual agreement and affection expression.These findings are consistent with Daneshvar (2013) (narrative therapy has positive effects on reduction of marital pointlessness), Vromans and Schweitzer (2011) (narrative therapy has positive effects on reduction of major depression and interpersonal relationships), Kashin et al (2013) (narrative therapy can help identification of future challenges and common problems by developing skills), Nouri Tirtashi and Kazemi (2012) (narrative therapy increases the women`s tendency to forgiveness) and Rabiei, Fatehi and Bahrami (2012) (couple`s narrative therapy improves couples` family performance and its scopes and it is under the effect of their gender).

In explaining the efficacy of narrative therapy on marital adjustment and its components it should be said that narrative therapy reduces women`s conflicts in their relationships with their husbands. Therefore, their quality of life and the family members` health increases and the couple`s attraction and understanding is improved. In addition, the couples` satisfaction, solidarity, agreement and affection expression is increased. The aim of narrative therapy is considering the dysfunctional beliefs and changing them, externalizing andweakening the problems, creating external look towards problems from different perspectives and consequently and creating and setting out a different image for narrating the life story. Therefore, narrative therapy can help people to have a new perspective towards reality. This causes people to provide themselves with more effective interpersonal relationships, to help them have complete satisfaction of physical and emotional needs, to increase their mutual understanding, to have similar opinions and finally, to gain the ability to modify and solve practical problems. The process of creating new stories from past events, create a personal need in couples to reinterpret their past events and enables them to better overcome their future challenges. In the process of narrative therapy sessions, the therapist helps these families to create new stories and asks them to express their unique and special results (e.g. a situation in which families can reach to their goals by using their own solutions). The purpose of such interventions is to help referees to externalize their hard problems. When such problems externalize, the couples` understanding increases and consequently, their interpretations and viewpoints will be closer to one another and finer degree of adjustment emerges in them.

Satisfying marital relationships is the base of family`s good performance which facilitates the role of parents directly or indirectly, improves children`s relationship with each other and their parent and develops competence and ability among children. Totally, families in which both mother and father live together with high adjustment and understanding, have more desirable emotional status with their children. The low level of mutual companionship, commitment, agreement and forgiveness is a useful index to assess the level of marital conflicts, because forgiveness and achieving agreement reduces verbal aggressive behavior towards each other (Vinchman, Pich & Davilla, 2010). This approach is possible to achieve through narrative therapy approach.

Moreover, avoidance to interact with each other in behavioral complications –such as avoiding to answer, having unrealistic expectations from each other, having illogical or unrealistic beliefs towards one`s spouse and relationship- increases the level of marital conflict. This conflict can be solved using narrative therapy approach and verbal and behavioral interactions.

During the therapy sessions, the therapist creates positive attitude and hope in the client towards positive examples that been treated previously. The therapist also asks the client to explain his life events in the form of a story and helps her to divide his life-story into different chapters and name these events. Then, the therapist asks them to analyze these important and effective memories and to state a new story for their lives and to have a new look towards marital life. By doing so, they can have a better understanding of themselves and their spouses and consequently, their marital adjustment will be increased.

The therapist attempted to make the clientslearn that marital conflicts are somehow natural and that they are not the cause of their problems. Problems are caused because of the way by which the couples react to their inevitable differences and the way they tell their stories. The center part of narrative therapy is people and they are regarded as a specialist in their own lives. Such viewpoint considers that problems are apart from

people and assumes that people have the required skill and capability to change their communication with their problems and relationships and to improve their adjustments.

Regarding marital adjustment, most of the times, couples have different viewpoint towards a subject or event. This will cause reduction of adjustment and impairment in relationships. Narrative therapy has attempted to approximate the couples` viewpoint towards life events. In fact, the couples` different narratives cause problems. Narrative therapy takes attention to stories upon which we live. The stories which are in our minds concerning who we are and what is important for us. Narrative therapy includes discovering these stories, understanding and restating them. Narrative is a form of conversation which relates important events over time and let people to express their life story in front of their spouse without being criticized, and talk about their emotional aspects. This process includes stating, listening, restating and re-listening to these stories. These stories provide materials and sources to draw meaning, understanding and insight. The most important part of treatment is helping the individuals to understand and relate the relationship between their stories with others and their lives.

During the training sessions and after that, women participating in the research sample claimed that their interactions are increased and that they feel lucky, mutual understanding and support and optional care and responsibility towards each other and their family. This will in turn have direct effect on marital satisfaction, marital solidarity, mutual agreement and affection expression all of which are regarded as the most important components of marital adjustment. During treatment sessions, the therapist ensures that the new story is rich enough for the client and her future. Then, the therapist summarizes each session, analyzes the patient`s capabilities in new situations that will occur in near future and calls on the patient`s spouse to participate in the sessions and help him improve the therapy process. By doing so, adjustment and its components will be improved and the effects of this approach will not just be limited to training sessions.

In summary, the findings of the present study revealed that narrative therapy reduces marital conflicts. The research results add to the richness of recent findings in the field of research variables and considering narrative therapy as a new approach towards the classic psychoanalysis. To point out some limitations of this study we can talk about sexual restrictions; as all the participants in the study were women, we should be cautious in generalizing the research results to men. Also, many effective religious, social and psychological factors that may affect the treatment results (e.g. depression, anxiety and social, local beliefs, etc.) are not being controlled. Thus, the authors suggest other researchers to assign more sessions in order to reduce the couples` conflicts. By doing so, therapists can present a more comprehensive training and by more repetition and practice they will have lasting impacts and changes. Also, the authors suggest researchers to analyze the efficacy of treatment interventions by using other approaches. In order to generalize the present research findings, scholars are suggested to conduct such study in other districts. In addition, this therapeutic method can be applied on different age groups in clinics, prisons, courts and other institutions. The research results not only can pave the way for larger scale studies, but also it can emphasize on the necessity to teach family members in order to make them being aware of factors that can improve the quality of marital relationships.

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