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Comparison of Two Methods of Direct and Indirect Education on Osteoporosis Preventive Behaviors among Female Students

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Abstract

Background

Osteoporosis is the most common metabolic bone disease that decreases bone mass, causes destruction and eventually friability. This disease is preventable, and because adolescent females are the high-risk population, teaching this age group is of the utmost importance. The aim of this study was to compare the effects of the two educational methods (Lecture and Pamphlet) on osteoporosis preventive behaviors among female students.

Materials and Methods: This was a randomized clinical trial (RCT). To collect data, demographic questionnaire, food frequency questionnaire (FFQ), and physical activity questionnaire were used. Subjects were 205 seventh-grade girls who were selected by multistage random method and allocated in two experimental (Lecture = 68, Pamphlet = 67) and 70 for control group. In the Lecture group, there were 5 sessions of training, each of which lasted 60 minutes. In the Pamphlet group, only educational pamphlets were given, and no interventions were performed in the control group. Data were analyzed through statistical software SPSS version 21.0. Descriptive statistics, chi-square tests, t-test and ANOVA were applied to analyze the data.

Results: The mean age of the students was 13 $\pm$ 0.856 years old and there was no difference in terms of demographic variables between intervention and control groups. The results identified the mean scores of physical activity behaviors significantly improved two mounts after the intervention in the lecture group (P=0.001). While, the men scores of the pamphlet group had no significant changes after two months, but the differences of the both group compared to the control group were significant. Considering the significant decreased in the control group (P= 001). The mean scores of calcium intake in the two lecture and pamphlet groups significantly increased (P<0.001), while, as it was expected no significant changes in the control group after the intervention.

Conclusion: The osteoporosis preventive behaviors intervention improved the preventive behaviors of the participants. The results showed the effectiveness of education in both Pamphlet and Lecture group, because calcium intake and physical activity were significantly increased compared to pre-intervention and the control group.

Key Words: Education, Grade seven, Osteoporosis, Preventive activities, Students.

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1- INTRODUCTION

What has attracted the attention of researchers and planners is remarkable spread of chronic diseases in all countries and its epidemiological change in the middle age and old age and trend toward chronic diseases (1). One of the chronic diseases affecting the life of a society, especially women and girls is osteoporosis (2). Osteoporosis is the most common metabolic bone disease characterized by low bone mass and deterioration of bone tissue and thus bones become thin and fragile. This is due not only to increased life expectancy and aging, but also adverse changes in lifestyle and diet (3).

According to the International Committee of Osteoporosis in the fourth International Symposium 1993 (Hong Kong), osteoporosis was a diffuse disease with bone loss and microscopic structural change of bone tissue and leads to increased fragility and vulnerability of bone (4, 5). This disease is one of the major causes of disability and death in elderly as the World Health Organization (WHO), declared it as the main enemy of mankind and the fourth most important cause of bone fractures in the world (6). It is predicted that by 2020 almost 61 million people worldwide have osteoporosis or low bone mass (7).

Osteoporosis is considered as a major problem because this disease is associated with many disabilities, it is a cause of mortality, it has adverse effects on quality of life, and it imposes heavy costs on the individuals and community (8). According to the statistics of Rheumatology Research Center of Tehran University, 6 million Iranians are affected by osteoporosis and from 5 million postmenopausal women, 2.5 million people have osteoporosis. Also, taking into account the age, it should be said that 50% of men and 70% of women over 50 years old, have osteoporosis or low bone mass. In addition, about 200 to 400 thousand fractures occur in Iran which a large percentage of it is caused by osteoporosis. Expenditure incurred to the government due to hip fracture and surgery is over 120 billion Rails annually (9). The findings of various studies show that sports along with calcium and vitamin D intake, has a large impact on reducing the rate of loss of bone density and improving bone mass measurement (BMD) (10). Good nutrition in young people and adults can help to maintain bone mass and strength, varied and enjoyable eating habits that are rich in calcium is an instruction which at any time increases bone strength and improves the quality of life (11).

Regular physical activity not only promotes healthy bone, but also by increasing muscle strength and creating balance and harmony in the body, has a direct impact on overall health (12). Considering the risk factors of osteoporosis affecting its incidence and progress, it can be claimed that this disease is formed in childhood and occurs in old age (13). Mass in adolescence, leads to doubling the risk of osteoporosis in adults; thus, childhood and adolescence is the best time to increase bone mass through modification of lifestyle and environmental factors (14).

In prevention of osteoporosis girls are more important than boys, because in addition to being more likely to develop in them, girls are future mothers and many of diet concepts at this age are obtained by them and in the future, have permanent effects not only on their health, but also on the health of infants and children and their families (15). Some studies emphasized the positive effects of educational intervention on improving the student's quality of life (16-20). Two general approaches have been taught in training programs, teacher-centered approach that the teacher is mainstay of the student which is often Lecture method and another pattern which concerned about the learner, their needs and abilities is student-centered

model (21). The most common teacher-centered method is Lecture that has advantages such as cost-effectiveness, direct, systematic and logical presentation (22). Self-education is another educational ways in which through the person's activities, contents are given that, pamphlets is one of these methods, which has the advantages such as browsing capabilities, low cost, reproducibility and saving time and manpower (23).

Considering the importance of appropriate and effective teaching methods in the prevention of this disease and several teaching methods, especially in the area of healthcare that most of the methods, such as lectures and pamphlets are used, we decided to compare the effects of two direct and indirect educational methods on osteoporosis preventive behaviors among female students, Andisheh, Shahriar County of Tehran province, Iran (**Figure.1**).

Fig.1: The location of Andisheh city, Iran.

2- MATERIALS AND METHODS

2-1. Participants and design

This study was a clinical trial (IRCT.2016112231014N1) with a pre-test-post-test control group design, and random assignment. This RCT was conducted to measure the effect of the two educational methods (pamphlet with lecture) on osteoporosis preventive behaviors of female seventh grade students. This intervention was conducted on Jan 2016 to Mar 2016. Target populations were female seventh grade students in the city of Andisheh, Shahriar County of Tehran province, Iran.

The subjects included 230 seventh grade female students who were randomly allocated in the two experimental (Pamphlet group, n=67 and Lecture group, n=68), and one control group (n=70).

To determine the sample size, we applied the following formula:

$$N= 2 (Z 1+ Z 2) 2\times S 2/ d 2$$

With considering 10 percent for drop-out or nonparticipation, that led to an optimal sample size of at least 70 in each group. 95% confidence level (CI) and 80% power of the test were considered. The variance of the intended attribute was also used from previous studies (24).

The pre-test was implemented after initial coordination with the education departments and schools and obtaining the students' consent letter. Then, based on the literature review and the results of pre-tests, as an educational needs assessment, the educational contents were developed.

Next, the pamphlet was designed based on the educational contents and the students' age group. The pamphlet contained materials about osteoporosis, symptoms, complications, risk factors and the role of preventive behaviors content validity of the pamphlet was assessed by four specialists, and their comments were considered. The amended version of the pamphlet was distributed in the groups of experiment two weeks after pre-test. Post-test was carried out two months after the intervention. The collected data were analyzed using SPSS version 21.0, Chi-

square test, and paired t-test for the difference before and after intervention, and independent t-test to assess the significance of the differences between the two groups. Also, in the order to comply with research ethics, the control group was given the pamphlets after collecting the data in the second step.

2-1. Study population

This RCT study, designed in three groups (two experimental and one control group), in order to compare two educational methods of direct (Lecture) and indirect (Pamphlet) methods in the field of preventive behaviors of osteoporosis in female students of Andisheh city, Tehran province- Iran, in grade seven in the school year of 2016. Subjects were 205 seventh-grade girls who were selected by multistage random method and allocated in two experimental (Lecture = 68, Pamphlet = 67) and 70 for control group.

2-2. Measurement method and tools

To collect data, demographic questionnaire, food frequency questionnaire (FFQ), and physical activity questionnaire were used. Demographic questionnaire includes eight items such as: family size, mother's age, father's age, mother's occupation, father's occupation, mother's education, father's education and income level of the family.

Standard version of FFQ (24) was used to measure the calcium intake which contained 19 items related to calcium intake in adolescents. Daily calcium intake in adolescents is 1,300mg (22). The questionnaires were given to students to complete their average calcium intake in the previous month. Considering the food calcium intake table, which specifies grams per unit of food and the average daily calcium intake per person, was obtained by dividing the monthly amount to 30 and weekly amount to seven.

Standard adolescent physical activity is equal 60-minute moderate physical activity in a day (26). Validity and reliability of physical activity tool measured (24), and the same standard version applied. The questionnaire has consisted of 20 popular sports field, this questionnaire was given to students for six consecutive days. If the students complete at least 4 of six forms, it is acceptable. Finally, to calculate the amount of activity, the average student activity time is calculated.

After collecting pre-test data, educational intervention was designed in two forms of direct (group 1, Lecture) and indirect educational method (group 2, Pamphlet). Group 1 received lecture and group 2 received pamphlets and the control group received no intervention. All three groups completed the questionnaires pre and two mounts after the intervention.

2-3. Inclusion criteria

Seventh grade girls in the intermediate schools which did not participated in any educational programs for the prevention of osteoporosis were included in the participation.

2-4. Exclusion criteria

Lack of willingness and cooperation of the students to participate in the study at any stage of research and absenteeism, transfer or illness which makes it difficult for students to access were excluded from the study.

2-4. Intervention

Table.1 shows, the outlines of the educational intervention in Lecture group and the sessions, method, lecturer and the place. Considering the study conducted by Niazi et al. (24) that the interval of the intervention and the post-test was two mounts, this study also conceded two months interval between the intervention and the posttest.

Table-1: The outlines of the educational intervention

Outlines	Sessions	Method	Lecturer	Place
Osteoporosis's definition	1 session (60 minute)	Lecture	The first researcher	School's class
Osteoporosis's signs	1 session (60 minute)	Lecture	The first researcher	School's class
The causes and Osteoporosis's changeable and unchangeable factors	1 session (60 minute)	Lecture	The first researcher	School's class
The importance and the role of food regimen especially calcium intake amount on osteoporosis	1 session (60 minute)	Lecture	The first researcher	School's class
The importance and the role of physical activity on preventing osteoporosis	1 session (60 minute)	Lecture	The first researcher	School's class

2-5. Ethical considerations

This research is part of a Master thesis in Tarbiat Modares University, Tehran, and has been confirmed in the Ethics Committee of Tarbiat Modares University (with the reference number 52D/6584, 2015).

2-6. Data analysis

Data collected using software SPSS version 21.0software were analyzed by a paired t-test, analysis of variance (ANOVA) to compare the mean scores between groups, Chi-square in addition to the descriptive test. The ANOVA and Chi-square tests were used to analyze the demographic information and to compare mean differences among the three groups. The paired T test was used to assess the differences between groups before and after the intervention. P-values less than 0.05 were considered statistically significant.

3- RESULTS

The results of the study showed, the mean age of the students was 13 $\pm$ 0.856 years old and family size was 4, in terms of the level of parental education 30.6% and 12.06% of fathers and mothers were college-educated and 1.9% were illiterate, respectively. In terms of occupation 1.46% of fathers were unemployed and 89.8% of mothers were housewives; 67.7% of families' income, have been classified at high levels (suppliers of living expenses). An increase in the duration of the physical activity was observed in terms of physical activity in the experimental group 1 (Lecture), and the experimental group 2 (Pamphlet), which was not significant. In the control group, as it is expected not any increase was seen in the control group, but also there has been a decline in the duration of exercise.

With regard to physical activity paired t-test showed a significant difference two months before and after the educational intervention in the control group ($P < 0.001$). ANOVA test showed that there was no significant difference between the groups before the intervention ($P = 0.21$), while after the training a significant difference was observed between the groups ($P < 0.001$) (**Table.2**).

With regard to eating behavior also a significant increase of calcium intake was observed in the intervention groups (Lecture and pamphlet). The difference between calcium intake in the two experimental and control groups was significant ($P < 0.001$). The ANOVA test showed no significant difference between the groups before the intervention ($P = 0.393$), but two months after the educational intervention, a significant difference was observed between the three groups ($P < 0.001$) (**Table.3**).

Table-2: The mean of physical activity before and 2- month after intervention in cases and control groups

Physical activity	Before intervention	Two month after intervention	P-value
	Mean ± SD	Mean ± SD	
Lecture group	9.253±7.201	14.019±7.32	0.001
Pamphlet group	11.540±8.285	11.57± 7.942	0.972
Control group	10.613± 7.360	7.699 ± 6.933	0.001
P-value	0.217	0.001	

*Data are presented as mean± standard deviation (SD).

Table-3: The mean of calcium intake before and 2- month after intervention in the three groups

Calcium intake	Before intervention	Two month after intervention	P-value
	Mean ± SD	Mean ± SD	
Lecture group	877.7± 139.85	1056.56± 155.1	0.001
Pamphlet group	887.3± 148.3	962.2± 150.2	0.001
Control group	852.8± 166.8	867.01±174.06	0.573
P-value	0.393	0.001	

*Data are presented as mean± standard deviation (SD).

4- DISCUSSION

Osteoporosis is a serious and debilitating disease. The aim of this study was to compare two methods of direct (Lecture) and indirect (Pamphlet) education on osteoporosis preventive behaviors. Considering the importance and prevalence of this disease in women, girl students were selected for the study. Since calcium is the most important ingredient for health of the bones and various research confirms the importance of calcium in bone health, so to assess the nutritional status of students their calcium intake were calculated and the amount before and after the intervention were compared, that findings indicate the increase of calcium intake from 887.34 to 962.2 mg in groups Lecture, and from 877.1 to 1056.56 mg in group Pamphlet; in the control group a slight increase from 852.8 to 867.01 mg was also observed . About calcium intake of students, it can be said that the training could affect their nutritional performance and while the Lecture group, experiences more increase than Pamphlet group in calcium intake compared to pre intervention. In this regard, Hazavehei et al.'s study can be noted that training based on Health Belief Model one month after the educational intervention in nutritional performance of students has increased (27). Khorsandi and and colleagues conducted a study in this regard and they have observed a significant increase in calcium intake (6).

Bhursoy et al. also conducted a study on people over 40 years that the results have indicates a positive impact on people's awareness and self-efficacy and calcium intake (28). Francic et al. (29), also conducted a study with the aim of increasing knowledge and performance of prevention of osteoporosis with an emphasis on diet and exercise that the results indicate higher performance of the experimental group compared to the control group. The results of this study are also consistent with studies of Bohatyet al. (30), and Tussing and Champan –

Novakofski (31).In a study conducted by Sedalk et al. at on the effect of educational intervention on osteoporosis increase in women; calcium intake had increased significantly after the intervention (32). According to EbadiFrd azr and colleagues' study, people after receiving their training, were also found themselves at higher risk of osteoporosis compared to subjects and had a greater understanding in terms of severity and seriousness of the risk and its consequences (9) which is consistent with the current study. No study was found that violates the results of this study.

In this study, before the intervention, there was no significant difference between the average performance of students on calcium intake in both groups (P = 0.911), while two months after the intervention, a significant difference between the groups (P <0.001) was observed, demonstrating the positive impact of education. Exercise and physical activity, also plays an important role in maintaining and improving bone density. The results of this study on physical activity of the students, also reflects the positive impact of education because, in the lecture group, an increase in the average duration of exercise from 9.2 to 14 minutes and in the pamphlet group from 11.54 to 11.57 minutes was observed, but it was not significant. In the control group a significant decrease in the time from 10.6 to 7.6 was observed.

Niazi et al.'s study on physical activities can also be noted that their results show a significant difference before and after the educational intervention (24). Ebadi Fard Azar et al. also, reported a significant difference pre and post intervention on rural women (9). Khorsandi and colleagues conducted a study to evaluate the performance of pregnant women in Arak city, that its results have indicated positive effects of education (6). Shakil et al. in their study concluded that the knowledge and preventive behaviors have been increased after the intervention (33). Also, Cavalieri et al. in a study assessed the effectiveness of prevention programs on women's osteoporosis which showed that the intervention group compared with the control group, had a higher calcium intake and physical activity (34). But according to Estok et al., intervention increased calcium intake, but had no effect on physical activity which can sometimes due to age differences in the two studies, and also different intervention period. Also, in the present study, the younger participant than the Estok's study, and also easier access to do physical activity for students in the schools (32) in compare with the Estok's study participants (35) could be the results of being different.

4-1. Strengthen and Limitations

Three groups study including two comparison (Lecture and Pamphlet), and one control groups facilitate the researcher to develop a precise and comprehensive results for the study. There were some limitations in our study that, should be noted; first, the findings of this study may be generalized only to the students of seventh grade. The second, may be related to the method of gathering data as a self-report which, could end to over and or under estimation of the results.

5- CONCLUSION

The aim of this study was to compare two educational methods of direct (Lecture) and indirect (Pamphlet) methods for knowledge and preventive behaviors for osteoporosis. The results showed the effectiveness of education in both Pamphlet and Lecture groups, because calcium intake and physical activity were significantly increased compared to pre-intervention and the control group, but the lecture group have had a greater increase in calcium intake and physical activity; because in the Lecture method, the direct relation between the trainer and the student and the possibility of questions and answers, and removing ambiguities were

observed; whereas in indirect education group (Pamphlets), these benefits were not existed. The results of this study indicated the need for epidemiological assessments and teen age osteoporosis continuous education. For improving knowledge, promote their performance and attitudes.

Considering, their ability to perform physical activity more easily than older and also the effects of physical activity to prevent the possibility of osteoporosis. Ultimately, the results of this study revealed that, both lecture and pamphlet education method caused improved on calcium intake and physical activities of osteoporosis preventive behaviors. But, lecturing method was more effective than pamphlet method because of the possibility of removing ambiguity of the educational content, Therefore, in case of limited budget and personnel or any of necessary resources, included of educational facilities and needs, lecture is more useful than pamphlet and pamphlet is more better than no education.

6- CONFLICT OF INTEREST: None.

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