

The Effect of Family-Centered Education on Increasing Consumption of Calcium-Rich Foods in the Family Food Basket

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Background: Getting enough calcium in growing is necessary to achieve peak bone mass and to prevent osteoporosis in adulthood and aging.

Objectives: Given the importance of women's role in arranging and preparing the family food basket, the present study aimed to raise the mothers' knowledge and attitude to increase consumption of calcium-rich foods in family food basket and enhance adolescent girl's performance in the city of Chabahar.

Patients and Methods: This experimental study was performed on mothers of female students in the fifth grade of primary school in selected primary schools of Chabahar city during 2014. The population under study was selected by random sampling multi-stage stratified method. The study comprised 170 eligible mothers including 88 controls and 82 tests, selected on voluntary basis, who provided their written informed consent to participate in the study. Data collection tool was validated and reliable self-administered questionnaire consisting of three sections. These included demographic information and questions related KAP (knowledge, attitudes and practice) model comprising three structures so called knowledge, attitude and practice related to calcium containing foods. The completion of questionnaire was based on self-report and interview in two stages by the researcher, before and three months after educational intervention. The data collected were analyzed by SPSS-16 using descriptive and analytical statistical tests such as paired T-test at $\alpha = 0.05$.

Results: A statistically significant mean score of knowledge and attitude was found after intervention in case group. However, the changes in mean score performance variables after the intervention in the case group were not significant.

Conclusions: Designed and implemented educational intervention was effective in increasing the mother's knowledge and attitude, but was not effective regarding the intake of calcium-rich foods in target group. This weakness can be attributed primarily to the content and type of intervention carried out and secondly to insufficient educational interventions and sample size compatible with acceptable performance that suggested conducting more effective educational and ecological interventions.

Keywords: Education; Calcium; Mother; Student

1. Background

Human health is completely affected by the quality and type of consumed foods, because proper diet preserves the health and prevents chronic diseases (1). Calcium is essential for maintaining bone health in children in whom the optimum dietary intake of calcium, particularly in the form of dairy foods, has not been well-defined. Calcium is the most abundant mineral in the body which up to 99 percent is accumulated in the bones and teeth (2, 3) and its deficiency is a major world problem. Various studies revealed that the problem is

worldwide including Iran. Insufficient calcium intake is a great concern among Iranian women (4). Calcium plays different roles in body including bone and teeth formation, body growth, blood coagulation, catalyzed biologic reactions and prevention of the cell membrane function (5, 6). Nearly, whenever calcium intake is less than the suggested amount, the blood parathyroid hormone (PTH) concentration increases which in turn reduce the bone mass (7).

One of the crucial problems of insufficient calcium in-

take is osteoporosis so called the present time silent epidemic (8). Osteoporosis is a serious skeletal disease for which there is no cure at present, but great emphasis has been placed on its prevention, by optimizing peak bone mass. There is increasing evidence that regular weight-bearing exercise is an effective strategy for enhancing bone status during growth (9). Stability and strength of the bone tissue is closely related to calcium metabolism which is in turn affected by various factors such as genetics, nutrition and physical activities (10). Studies have estimated that 20-50% of bone density changes are rooted in life style, specifically by nutrition (11). Researches indicated that sufficient calcium intake and physical activity are vital in prevention of osteoporosis (12, 13). In this context, Liew et al. (12) reported that Asian females have less calcium intake. Kasper et al. (13) concluded that women did not receive the proposed amount of calcium and did not have sufficient exercises to secure healthy bones. They also had little concern about osteoporosis and assumed that it was less serious than other disease (13). The study on 24-hour calcium intake in Jahrom-Iran population aged over 45 years, showed a high prevalence of calcium consumption deficiency (14). Disorders such as osteoporosis and rickets have a complex etiology, but their consequences may be prevented or reduced through sufficient nutrition throughout life, especially in childhood and adolescence (7).

Since human health develops during the childhood, appropriate feeding is of great importance in human growth process, both in physical and mental health (1). On the other hand, many healthy and unhealthy behaviors are formed during childhood (15). Regarding the important role of mothers in preparation and planning the family food basket, as well as their influence on children, specifically daughters, it seems that intervention in this group is quite necessary. The Cap model as the first and the most basic model for changing behaviors including the health-related behaviors has been applied in various studies and proved its efficacy (16).

2. Objectives

we have conducted the present study aiming at raising mothers' knowledge and insight over calcium rich nutrition and promotion of health in female adolescents in the city of Chabahar, since earlier studies reported that people in Sistan and Baluchestan province were not aware of acquiring proper nutritional ingredients (17).

3. Patients and Methods

This experimental study was an educational and monitoring intervention comprising mothers of fifth grade students in primary schools in the city of Chabahar in southern of Iran in 2013-14.

3.1. Samples

Samples were selected using random satisfied multistage method, so that two female public primary schools were selected randomly from all schools in Chabahar. One school was used to select mothers for test group and educational intervention, and the other chosen as control group mothers. The populations under study were similar with respect to social and economic conditions. The sample size which included 82 as case and 88 as control groups were qualified volunteers who gave their written consent prior to taking part in the study.

3.2. Data Collection Instrument

The research instrument was a validated and reliable self-administered questionnaire. The instrument validity was confirmed by an expert panel consisting of 14 health and nutrition experts. Reliability was confirmed through a pretest among mothers with characteristics similar to those in test group ($\alpha = 0.86$). The questionnaire consisted of 30 items; seven items related to demographic and background information including parents' education and occupation, residence, number of children, nutritional disorders such as calcium and vitamin D deficiency and anemia.

3.3. Knowledge Measurements Questionnaire

This questionnaire consisted of ten items associated with bone fragility and osteoporosis. The answers were scored based on three scales of correct (3 scores), I don't know (2 scores), and False (1 score). The reliability value was 0.86 and the score limits were 10-30.

3.4. Attitude Measurement Questionnaire

This questionnaire consists of five items associated with consolidation of bones and teeth by milk and dairy consumption. The answers were scaled as agree (3 scores), no idea (2 scores), and disagree (1 score). The reliability was 0.85 and score range of 5-15, where the higher score represented more positive approach towards consuming calcium contained nutrients and positive effects of calcium.

3.5. Performance Measurement Questionnaire

This questionnaire consisted of 8 questions; for instance: How many glasses of milk have your child consumed in the last week? The answer scale was a two degree scale of has drunk, has not drunk? (Based on a standard Consumed per week was evaluated) The reliability value was 0.97, indicating more proper feeding performance. The eight questions concerned about medium physical activity with the score of 1 for yes and zero for no. Exclusion criteria were disagreement with participation in each stage of study and not being resident of Chabahar. It must be mentioned that the study was

based on coordination between authorities of Tarbiat Modares University, Research Center for Health and Social Welfare in Chabahar, and Chabahar Education and Training Office.

3.6. Procedures

3.6.1. Descriptive Stage and Determining the Educational Needs (Educational Determinations)

Following selection of mothers and classifying them randomly into test and control groups, they were invited to attend a session where they required completing the questionnaires. The questionnaires completed by mothers and by the researcher for illiterate mothers were collected and analyzed using SPSS-16. Also, statistical tests included chi-square (to properly classify participants in two groups), concerning the corresponding variables, descriptive test of average and standard deviation applied to determine mothers' knowledge, approach and performance as well as their educational weak points.

3.6.2. Specifying Educational Materials and Preparing Curriculum (Educational Planning)

Following the analysis of the first stage data and specifying the mothers' educational and weak points' an educational program was designed that related to the importance of consuming calcium rich nutrients in the region and replacing them with appropriate entities. These include economic and position of the society, results and consequences of calcium deficiency, solutions for providing appropriate and cost-effective calcium, mothers' role in preparing the family's nutritional basket, daily dose of calcium for different age and gender groups, specifying the importance of mother's role in creating feeding habits in their children, especially in their daughters, as well as their role in consulting with fathers about purchasing proper food ingredients, introducing crucial sources of information to mothers to make them capable of achieving exact and simple knowledge about calcium, its sources and importance. Then the reliable scientific text and references were gathered based on the statistical analysis results as the educational sources.

3.6.3. Educational Intervention Stage

In this stage, all educational texts were transformed to film and education materials which were applied besides face to face and oral instructions in order to integrate them in educational programs. Concerning the participants' limitations and their daily affairs and with regard to the educational texts, each instructional

session was limited to 60-minutes, held in children's schools. It's worth mentioning that all programs were implemented by the researcher. Audiovisual educational aids were also applied to improve the participants' concentration and their knowledge about some calcium rich nutrients available in the region such as milk, fish and dairy. At the end of each session mothers were asked some questions and invited to actively participate in discussions. They were also served with calcium rich nutrients in order to encourage using them in family foods basket.

3.6.4. Data Collection Stage and Determining the Effectiveness of the Educational Intervention (Educational Evaluation)

At the end of the previous stage and according to the early planning, researcher received mothers' telephone numbers for sending those SMS three months later and inviting them to participate in self-reporting session and complete the earlier questionnaires. The purpose of considering a three months interval was to prevent the immediate effects of the education and to evaluate information durability. The collected data were analyzed using SPSS-16 and the related tests were conducted to evaluate the intervention results at meaningful level of 0.05; the tests used were the independent t-Test, paired t-Test and Pearson correlation test.

4. Results

Generally, there were no meaningful differences between the background and demographic variables of the participants (Table 1). The mean score of knowledge before intervention for test group was 24.94 ± 2.90 and for control was 24.92 ± 3.30 , and the source changed into 26.44 ± 2.37 for test group that signified the meaningfulness of the intervention ($P < 0.001$) and into 25.01 ± 3.99 for control group after intervention ($P = 0.480$). The mean score of attitude before intervention for test group was 12.48 ± 1.85 and for control group was 12.81 ± 1.59 , but after intervention the test group changed to 13.16 ± 1.48 , which was meaningful ($P < 0.009$). The control group after intervention changed to 12.40 ± 1.48 that was not statistically significant ($P = 0.082$). With respect to performance, there were no changes in test group in regard to receiving milk, dairy, fish, and meat. Inclusion criteria in the control group were the same as inclusion criteria in the test group. Only control group did not receive any training (Table 2). Physical activity in test and control group before intervention was 0-210 minute(s) that was not statistically significant ($P = 0/142$). 3 months after intervention physical activity increased in both group but in control group increasing was more than test group ($P = 0/005$) (Tables 3 and 4).

Table 1. Frequency of the Background and Demographic Variables in Test and Control Groups^a

Variables	Test	Control	Total
Fathers education			
Illiterate	16 (19.5)	19 (21.6)	35 (20.6)
Primary	18 (22)	25 (28.4)	43 (25.3)
Guidance	30 (36.6)	17 (19.3)	47 (27.6)
High school	10 (12.2)	21 (23.9)	31 (18.2)
Academic	8 (9.8)	6 (6.8)	14 (8.2)
Total	82 (100)	88 (100)	170 (100)
Mothers education			
Illiterate	22 (26.8)	27 (30.7)	49 (28.8)
Primary	38 (46.3)	36 (40.9)	74 (43.5)
Guidance	14 (17.1)	11 (12.5)	25 (14.7)
High school	6 (7.3)	12 (13.6)	18 (10.6)
Academic	2 (2.4)	2 (2.3)	4 (2.4)
Total	82 (100)	88 (100)	170 (100)
Mothers occupation			
Housekeeper	74 (90.2)	76 (86.4)	150 (88.2)
Worker	3 (3.7)	1 (1.1)	4 (2.4)
Clerk	2 (2.4)	6 (6.8)	8 (4.7)
Personal	3 (3.7)	5 (5.7)	8 (4.7)
Retired	0 (0)	0 (0)	0 (0)
Total	82 (100)	88 (100)	170 (100)
Fathers occupation			
Unemployed	18 (22)	25 (28.4)	43 (25.3)
Worker	18 (22)	24 (27.3)	42 (24.7)
Clerk	12 (14.6)	11 (12.5)	23 (13.5)
Personal	33 (40.2)	27 (30.7)	60 (35.3)
Retired	1 (1.2)	1 (1.1)	2 (1.2)
Total	82 (100)	88 (100)	170 (100)
Residence status			
Owner	62 (75.6)	61 (69.3)	123 (72.4)
Rent	12 (14.6)	19 (21.6)	31 (18.2)
Organizational	4 (4.9)	3 (3.4)	7 (4.1)
Other	4 (4.9)	5 (5.7)	9 (5.3)
Total	82 (100)	88 (100)	170 (100)
Number of children			
1-6	60 (73.1)	65 (73.8)	125 (73.5)
7-16	22 (26.9)	23 (26.2)	45 (26.5)
Total	82 (100)	88 (100)	170 (100)
Deficiencies among the children			
Calcium deficiency	5 (6.1)	6 (6.8)	11 (6.5)
Anemia	30 (36.6)	22 (25)	52 (30.6)
Vitamin D V	4 (4.9)	3 (3.4)	7 (4.1)

^a Data are presented as No. (%).

Table 2. Comparison of Weekly Protein Intake (Meat and Fish) in Adolescents in Control Group Before and 3 Months After Educational Intervention ^a

Protein-Rich Foods	Before Educational Intervention	After Educational Intervention	P Value
Fish, unit			0.990
0-7	78 (88.6)	76 (86.4)	
8-14	10 (11.4)	9 (10.2)	
≥ 15	0 (0)	0 (0)	
Meat, unit			0.990
0-7	80 (90.9)	79 (89.8)	
8-14	7 (8)	5 (5.7)	
≥ 15	1 (1.1)	1 (1.1)	
Meat and fish, unit			0.732
0-7	62 (70.5)	63 (71.6)	
8-14	20 (22.7)	16 (18.2)	
≥ 15	6 (6.8)	6 (6.8)	

^a Data are presented as No. (%).**Table 3.** Comparison of Weekly Physical Activity in Adolescents in Test and Control Groups Before and 3 Months After Educational Intervention ^a

Physical Activity, min	Test	Control	P Value
Before educational intervention			0.142
0-210	82 (100)	88 (100)	
≥ 211	0 (0)	0 (0)	
After educational intervention			0.005
0-210	35 (42.7)	56 (63.6)	
≥ 211	44 (53.7)	29 (33)	

^a Data are presented as No. (%).**Table 4.** Comparison of Weekly Physical Activity in Adolescents in Test and Control Groups Before and 3 Months After Educational Intervention ^a

Physical Activity, min	Before Educational Intervention	After Educational Intervention	P Value
Test			0.862
0-210	82 (100)	35 (42.7)	
≥ 211	0 (0)	44 (53.7)	
Control			< 0.001
0-210	88 (100)	56 (63.6)	
≥ 211	0 (0)	29 (33)	

^a Data are presented as No. (%).**Table 5.** Comparison of the Mean Scores of the Knowledge, Attitudes and Practice in Both Groups Before and After the Educational Intervention ^a

Variables	Before Educational Intervention	After Educational Intervention	P Value
Knowledge			
Test	24.94 ± 2.90	26.44 ± 2.37	< 0.001
Control	24.62 ± 3.30	25.01 ± 3.99	0.480
Attitude			
Test	12.48 ± 1.85	13.16 ± 1.46	0.009
Control	12.81 ± 1.59	12.40 ± 1.48	0.082
Performance			
Test	12.41 ± 11.92	24.54 ± 11.89	0.111
Control	20.49 ± 11.39	21.43 ± 12.20	0.510

^a Data are presented as Mean ± SD.

Table 6. Comparison of Weekly Calcium Intake in Adolescents in Test Group Before and 3 Months After Educational Intervention ^a

Calcium-Rich Foods	Before Educational Intervention	After Educational Intervention	P Value
Milk, unit			0.083
0-7	79 (96.3)	79 (96.3)	
8-14	3 (3.7)	0 (0)	
≥ 15	0 (0)	0 (0)	
Milk, yogurt, cheese, Ice cream, unit			0.053
0-7	17 (20.7)	8 (9.8)	
8-14	25 (30.5)	26 (31.7)	
≥ 15	40 (48.8)	45 (54.9)	
Fish, unit			0.439
0-7	74 (92.2)	74 (90.2)	
8-14	7 (8.5)	5 (6.1)	
≥ 15	1 (1.2)	0 (0)	

^a Data are presented as No. (%).**Table 7.** Comparison of Weekly Calcium Intake in Adolescents in Control Group Before and 3 Months After Educational Intervention ^a

Calcium-Rich Foods	Before Educational Intervention	After Educational Intervention	P Value
Milk, unit			0.429
0-7	83 (94.3)	83 (94.3)	
8-14	4 (5.4)	1 (1.1)	
≥ 15	1 (1.1)	1 (1.1)	
Dairy (milk, yogurt, cheese, ice cream, dugh), unit			0.048
0-7	21 (23.9)	15 (17)	
8-14	33 (37.5)	25 (28.4)	
≥ 15	34 (38.6)	45 (51.1)	
Fish, unit			0.990
0-7	78 (88.6)	76 (86.4)	
8-14	10 (11.4)	9 (10.2)	
≥ 15	0 (0)	0 (0)	

^a Data are presented as No. (%).**Table 8.** Comparison of Weekly Protein Intake (Meat and Fish) in Adolescents in Test Group Before and 3 Months After Educational Intervention ^a

Protein-Rich Foods	Before Educational Intervention	After Educational Intervention	P Value
Fish, unit			0.439
0-7	74 (90.2)	74 (90.2)	
8-14	7 (8.5)	5 (6.1)	
≥ 15	1 (1.2)	0 (0)	
Meat, unit			0.990
0-7	76 (92.7)	73 (89)	
8-14	6 (7.3)	6 (7.3)	
≥ 15	0 (0)	0 (0)	
Meat and fish, unit			0.144
0-7	59 (72)	50 (61)	
8-14	20 (24.4)	22 (26.8)	
≥ 15	3 (3.7)	7 (8.5)	

^a Data are presented as No. (%).

5. Discussion

This study was conducted to increase mothers' knowledge and approach, concerning inclusion of the calcium rich foods in family nutritional basket, especially for female adolescents in Chabahar-Iran. Since the studies revealed that the knowledge can be enhanced through educational programs (16), in this paper we have benefited from a wide variety of the related references and literature and concentrated on efficient educational factors in promoting the participants' knowledge. Having prepared the research instruments, we conducted the first stage of this descriptive study and identified the weaknesses and strengths of variables in mothers' knowledge (Table 5). Finally, the related educational texts were created to be used in the intervention processes. At the end and during three months follow up after intervention, the questions asked by the participants were answered through SMS. The results revealed that the participants' knowledge increased considerably (Tables 5 - 8), but as expected, no meaningful statistical changes were observed among the control group.

Our findings showed the beneficial effect of intervention on the participants, who were matched regarding demographic and background characteristics. There were no meaningful differences among the studied variables (knowledge, attitudes and practice). Hence we may conclude that the created difference in knowledge level in the two groups was rooted in education and instructions offered by the researcher. Therefore, we consider that the intervention is a successful procedure for studying similar population and even on larger scales.

Similar studies have been reported including the investigation carried out by Sanaie et al. who concentrated on family-centered education to increase adherence to the sport program in heart disease patients following surgery (18), which was consistent with our results in regard to the efficacy of the procedure in promoting the knowledge and performance of the participants. Hence, regarding the similar results of the two studies, we may indicate the importance and effectiveness of the family-centered education in health related problems, specifically in promotion of the knowledge about consuming more calcium rich nutrients. Kamjoo et al. investigated the effect of education on the knowledge of the female high school students in Bandar Abbas. The purpose of the study was to prevent osteoporosis. The results showed that the subjects' knowledge increased considerably after educational intervention, whereas there appeared no significant changes among the students of the control group (19). Their results were in agreement with those of Sanai Nasab et al. (20) and confirmed the efficacy of the educational program in enhancing the knowledge, attitude and performance of the participants.

Using the same procedure and approach, comparable results were obtained from intervention procedures revealed that education affects the members of the test

cases but had no influence on the control group (Tables 5, and 8). Therefore, the intervention has been efficient in promoting a positive approach toward the importance of consuming calcium containing foods among the test group. Accordingly, it may be concluded that the educational interventions had positive effect on the mothers' approach towards increasing consumption of calcium, body's daily need to calcium and other associated problems (Table 8).

Therefore, regarding the importance of knowledge, we can suggest that the type of education, the education program used, mode of follow up and answering the participants' questions after the intervention is a successful method and could be extended to similar situations and even on larger scales.

Among the similar studies we may point to that of Zhang et al. (21), who investigated the effect of education on osteoporosis prevention. Amini (22) also studied the effect of health education on promoting feeding behaviors that prevent osteoporosis among the female adolescents in Chabahar. This study showed that educational programs based on model and targeted ability changed attitude and reminded them as effective interventions in health. So again the importance and effectiveness of interventions to change attitudes through educational interventions is emphasized.

In this study, we measured the performance changes among the female members of the families which are under study, rather than among participating mothers, concerning the calcium intake. In other words, we measured indirect education-related changes which in turn indicates the variations in performance among mothers or families; because increase of mothers' knowledge as the house managers and regulator of family nutrients basket would affect the behavior of the other family members, including fathers as providers of food supplies. After conducting the foregoing procedures, we attempted to determine the efficient performances concerning the addition of calcium rich nutrients to the family basket in relation to increasing such nutrient intake, specifically by the girls. Two variables of knowledge and approach were considered in the educational interventions which aimed at determining the changes from consuming nutrients by the female members of the families. Unexpectedly, the results showed no statistically meaningful changes in girls' performance (Tables 6 and 8). Regarding the amount of changes despite of meaningful changing amounts, we may point to the discrepancies in the test group which is rooted in deficiency of changes in attitude and knowledge of mothers or other family members. This can be explained by the fact that despite education efficiency in promoting the knowledge and attitude, they are not sufficient at least for the target population. Therefore, emphasis should be placed on conducting more effective proce-

dures including environmental intervention or health promotion strategies. The other cause for insignificant changes regarding calcium rich-foods can be insufficient sample size.

Shojaezadeh et al. (23), Amini (22), and Damore et al. (24) did not achieve desired performance through educational intervention as in our model. Reicks et al. (25) who examined calcium intake interventions in families concluded that the interventions positively affected calcium intake in all nutrients groups, a finding contrary to our results. The differences may be attributed to the cultural characteristics of the studied populations. Also there are other reports which are in disagreement with our findings including those of Bohaty et al. (26), Francis et al. (27) and Shamsi et al. (28). Therefore, more educational interventions are suggested to explain the reasons for unsuccessful performances and to implement appropriate environmental interventions.

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Authors' Contributions

Study concept and design: Somayyeh Shalchi Oghli, Alireza Hidarnia and Shamsaddin Niknami. Acquisition of data: Somayyeh Shalchi Oghli. Analysis and interpretation of data: Somayyeh Shalchi Oghli and Alireza Hidarnia. Drafting of the manuscript: Somayyeh Shalchi Oghli, Alireza Hidarnia and Mahdi Mirzaei Alavijeh. Critical revision of the manuscript for important intellectual content: Somayyeh Shalchi Oghli, Alireza Hidarnia and Mahdi Mirzaei Alavijeh. Statistical analysis: Somayyeh Shalchi Oghli and Shohreh Shahmohammadi. Administrative, technical, and material support: Alireza Hidarnia and Shamsaddin Niknami. Study supervision: Alireza Hidarnia and Shamsaddin Niknami.

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References

- Javadi E, Hosein Nejad A, Khalilifard AR, Adibi H, Maghbooli Z, Ardeshir Larjani MB. [Correlation between bone mineral density and osteoporosis with Ca and vitamin D intake]. *TabibSharq J.* 2003;5(1):1.
- Huncharek M, Muscat J, Kupelnick B. Impact of dairy products and dietary calcium on bone-mineral content in children: results of a meta-analysis. *Bone.* 2008;43(2):312-21.
- Tavakkoli H, Asadi M, Haghghi M, Esmaeili A. Therapeutic approach to "downhill" esophageal varices bleeding due to superior vena cava syndrome in Behcet's disease: a case report. *BMC Gastroenterol.* 2006;6:43.
- Gallagher ML. The nutrient and their metabolism. In: Mahan LK, Escott Stump S editors. *Krause's Food & Nutrition therapy.* 12 ed. Canada: Saunders Company; 2008. pp.105-10.
- Rahmani K. *Comprehensive Lesson Plan for General Health.*: Samat; 2009.
- Escott-Stump S. *Nutrition and Diagnosis-related Care.* 6 ed Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2008.
- Mc Donald RE, Avery DR. *Avery Density for the child & Adolescent.* 7 ed; 2000.
- Salehipur M, Zavarreza J, Nejadi N, Mahmudi Baram S. *General Biology.* 2 ed Tehran: Khosravi and Dibaj Pub; 2010.
- Hind K, Burrows M. Weight-bearing exercise and bone mineral accrual in children and adolescents: a review of controlled trials. *Bone.* 2007;40(1):14-27.
- Genant HK, Cooper C, Poor G, Reid I, Ehrlich G, Kanis J, et al. Interim report and recommendations of the World Health Organization Task-Force for Osteoporosis. *Osteoporos Int.* 1999;10(4):259-64.
- Morgan SL. Calcium and vitamin D in osteoporosis. *Rheum Dis Clin North Am.* 2001;27(1):101-30.
- Liew YL, Mann D, Piterman L. Osteoporosis risks. A comparative study of Asian Australian and Caucasian Australian women. *Aust Fam Physician.* 2002;31(3):291-3.
- Kasper MJ, Peterson MG, Allegrante JP, Galsworthy TD, Gutin B. Knowledge, beliefs, and behaviors among college women concerning the prevention of osteoporosis. *Arch Fam Med.* 1994;3(8):696-702.
- Bahrami A, Nikniaz AR, Kusha A, Sohrabi H, Poordolati S, Bolandi A, editors. [Status of bone density in 20-69 years old people in Tabriz].; Proceeding of the second congress of prevention of non-communicable Disease.; 2003; p. 200.
- Orces CH, Casas C, Lee S, Garci-Cavazos R, White W. Determinants of osteoporosis prevention in low-income Mexican-American women. *South Med J.* 2003;96(5):458-64.
- Aalto M, Pekuri P, Seppa K. Primary health care nurses' and physicians' attitudes, knowledge and beliefs regarding brief intervention for heavy drinkers. *Addiction.* 2001;96(2):305-11.
- Nazary M, Niknami SH, Hidarnia A, Babaie G, Ghahremani L. Effect of health education on dietary behavior of elementary school girls. *Daneshvar.* 2006;13(6):65-70.
- Sanaie N, Nejati S, Zolfaghari M, Alhani F, Kazemnezhad A. [The Effects of Family-based Empowerment on Family Cooperation in Following Patient Treatment Regime after Coroner Arteries Bypass Surgery]. *Modern care J.* 2014;11(1):19-27.
- Kamjoo A, Shahi A, Dabiri F, Abedini S, Hosseini Teshnizi S, Pormehr Yabandeh A. [The effectiveness of education about osteoporosis prevention on awareness of female students]. *Hormozgan Med J.* 2012;16(1):60-5.
- Sanai Nasab H, Tavakoli H. [A survey on education and acculturation of amending the diet pattern among the military personnel of Tehran]. *Kar Salem J.* 2008;3(9):17-22.
- Zhang YP, Li XM, Wang DL, Guo XY, Guo X. Evaluation of educational program on osteoporosis awareness and prevention among nurse students in China. *Nurs Health Sci.* 2012;14(1):74-80.
- Amini A. *Effect of health education on promotion of the Osteoporosis preventive behaviors among the female adolescents in Chabahr.* Tehran: Tarbiat Modares University; 2013.
- Shojaezadeh D, Mehrab beic A, Mahmoodi M, Salehi L. [To Evaluate of Efficacy of Education based on Health Belief Model on Knowledge, Attitude and Practice among Women with Low Socioeconomic Status Regarding Osteoporosis Prevention]. *Iranian specialized Epidemiol J.* 2011;7(2):30-7.
- Damore D, Robbins L, Karl T. The Effects of an Educational Program on the Calcium Intake of Junior High School Students. *Internet J Pediatr Neonatol.* 2007;6(2):46-50.
- Reicks M, Ballejos ME, Goodell LS, Gunther C, Richards R, Wong SS, et al. Individual and family correlates of calcium-rich food in-

- take among parents of early adolescent children. *J Am Diet Assoc.* 2011;**11**(3):376-84.
26. Bohaty K, Rocole H, Wehling K, Waltman N. Testing the effectiveness of an educational intervention to increase dietary intake of calcium and vitamin D in young adult women. *J Am Acad Nurse Pract.* 2008;**20**(2):93-9.
27. Francis KL, Matthews BL, Van Mechelen W, Bennell KL, Osborne RH. Effectiveness of a community-based osteoporosis education and self-management course: a wait list controlled trial. *Osteoporos Int.* 2009;**20**(9):1563-70.
28. Shamsi M, Hidarnia A, Niknami S, Rafiee M, Zareban I, Karimy M. The Effect of Educational Program on Increasing Oral Health Behavior among Pregnant Women: Applying Health Belief Model. *Health Educ Health Promot.* 2014;**1**(2):21-36.