

Improvement of women's knowledge, attitude and practice regarding osteoporosis after an interventional educational program

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Abstract:

Background: Osteoporosis is a major health problem adversely affecting the quality of life and incurring extra costs on the patient and the society. Primary prevention is most important through healthy dietary habits and proper physical exercise. **Aim:** the study was carried out with the aim of evaluating the effect of an educational program about osteoporosis on improving women's knowledge, attitudes and practices. **Setting:** it was conducted in Minia city in Upper Egypt using a quasi-experimental design. **Sample:** a systematic random sample of 150 women was recruited from the registries of home visit program in the faculty of Nursing at Minia University. **Tool:** Data were collected using an interview questionnaire sheet assessing women's medical history, knowledge, attitude, and practices as well as risk factors for osteoporosis. An educational program based on pertinent literature, and in the light of the findings of the assessment phase was developed, implemented, and evaluated at the end of the program, and during the 3-month follow-up period. **The results** revealed that women's pre-program knowledge was low, but significantly improved at the post and follow-up phases ($p < 0.001$). Pre-program attitude and practice were better than knowledge; however, significant improvements were detected after the program. Multivariate analysis revealed that attendance of the program was the most important independent predictor of the scores of knowledge, attitude, and practice. **Conclusion:** the educational program based on needs assessment was effective in improving women's knowledge, attitude, and practice related to osteoporosis. **Recommendations:** it is recommended to use this educational program in communities where the risk factors of osteoporosis are prevalent. The role of health care professionals, including nurses, should be more activated.

Key words: Osteoporosis, Women health, Knowledge, Attitude, Practice, Education, Intervention

Introduction:

Osteoporosis is a significant public health problem. It is a silent killer with millions of people around the world suffering from it⁽¹⁾. It is important due to its morbidity, mortality, adverse effects on the quality of life and the extra cost imposed on patients and the societies⁽²⁾. The increase in life expectancy with associated rise in the numbers of the aged in the societies of developing countries led to an increase in the prevalence of osteoporosis and its subsequent complications⁽³⁾.

Certain factors are linked to the

development of osteoporosis or contribute to an individual's likelihood of developing the disease. These are called "risk factors". Risk factors can be classified as "modifiable" and non-modifiable". Non-modifiable factors among women include age, family history of osteoporosis and reproductive factors. Emphasis should be placed on identifying modifiable risk factors. Among women, these include smoking, current low body weight regardless of height, early menopause (<45 years of age, either natural or surgical), excessive alcohol

intake and low calcium intake ⁽⁴⁾.

Among the most important complications of osteoporosis are bone fractures, especially hip fracture among the aged ⁽⁵⁾. In the United States of America, osteoporosis causes as many as 300,000 hip fractures, 700,000 vertebral fractures, and 250,000 wrist fractures, in addition to other fractures ⁽⁶⁾. The susceptibility is higher among women, with one in two women over age 50 having the risk of a fracture related to osteoporosis in her lifetime ⁽⁷⁾. Moreover, the problems associated with bone loss and aging are not only medical and economic; but there are also social and cultural ramifications that affect the lives of the community ⁽⁸⁾. In Egypt, Sallam, Galal and Rashed⁽⁹⁾ reported a high prevalence of fracture neck femur among menopausal women with osteoporosis.

Primary prevention is of major importance in osteoporosis, and it should aim at optimizing bone mass growth to prevent bone loss later in life. Calcium intake is the most important element in building up bone mass, since bone is made of calcium mineral, and human body cannot produce calcium. Furthermore, the human body cannot absorb more than 500 mg of calcium at once. Therefore, it is recommended to take calcium, from the diet or supplement, several times a day in amounts of 500 mg or less⁽¹⁰⁾. Combining calcium with vitamin D has a synergistic effect for bone structure building up. Obtaining sufficient amounts of dietary vitamin D is not difficult. In addition, sunshine exposure is a natural source of vitamin D.⁽¹¹⁾

In order to plan for the prevention of osteoporosis, sufficient information about people's health beliefs and knowledge is necessary ⁽¹²⁾. Additionally, in order to change the

health behaviors related to modifiable risk factors of osteoporosis, it is necessary to be familiar with the individuals' practices for prevention, and also their cultural and socio-economical features. ⁽¹³⁾

There is a scarcity of local data pertaining to the effect of health education on the knowledge, attitude, and practice of women regarding osteoporosis. Therefore, the present study highlights the importance of educational interventions to prevent osteoporosis, emphasizing the healthy dietary habits and proper physical exercise.

Aim of the study:

The study was carried out with the aim of evaluating the effect of an educational program about osteoporosis on improving women's knowledge, attitude and practice.

Research questions:

To fulfill the aim of the study, the following research questions were formulated:

- What is the effect of applying an educational program about osteoporosis on improving women's knowledge, attitude and practice?
- Are there any significant differences between knowledge, attitude and practice during educational program?

Subjects and methods:

Research design and setting:

The study was conducted in Zohra village, at El-Minia district in Upper Egypt. A quasi-experimental design, with pre-post and follow-up assessments was applied.

Study subjects:

The study population consisted of

women from Zohra village, who are registered with their families in the field activities and home visit programs of the faculty of Nursing at Minia University. From the 1355 registries, a systematic random sample of 150 women was recruited from these registries according to the inclusion criteria of being female, above the age of 15 years and willing to attend the educational program. This sample was calculated to demonstrate an improvement in women's knowledge, attitude, and practice from 40% by 50% or more (Relative Risk 1.50) at 95% confidence level and 80% study power, with a compensation for a dropout of about 25%.

Data collection tool:

An interview questionnaire sheet was designed for data collection. It comprised five sections. The first section was for socio-demographic data. The second section covered the medical history of the woman, as well as the risk factors and symptoms related to osteoporosis. The third section included 21 multiple choice and true / false questions to assess woman's knowledge regarding the definition, risk factors, symptoms and signs, complications, diagnosis, management, and prevention of osteoporosis.

A score of 1 was given to each correct response and zero for the incorrect. For each area of knowledge, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the domain. These scores were converted into a percent score. Knowledge was considered satisfactory if the percent score was 60% or more and unsatisfactory if less than 60%.

The fourth section was about woman related practices such as

exposure to sun, physical activity, and dietary intake of fish and dairy products. The practice items reported to be done correctly were scored "1" and the items not done were scored "0". For each area, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score. The practice was considered adequate if the percent score was 60% or more and inadequate if less than 60%.

The last section consisted of a Likert scale based on Sedlak et al⁽¹⁴⁾ to measure woman's attitude related to physical activity, diet, risk factors such as smoking, and intake of vitamin D and Calcium. Each item had 3 levels of answers: "agree", "uncertain", and "disagree." These were respectively scored 3, 2, and 1. The scores of the items were summed-up and the total divided by the number of the items, giving a mean score. These scores were converted into a percent score. The attitude was considered positive if the percent score was 60% or greater, and negative if less.

Content validity of tools:

The content validity of tools revised by a panel of experts in nursing and medicine to ascertain its comprehensiveness and its content validity and according to their review few modifications were carried out in the content.

Pilot study:

A pilot study was conducted to test the applicability of the tools, the feasibility of the study and to estimate the time needed for data collection. It was conducted on 10% of the total sample. Simple modification was done of some items of the interview questionnaire and the assessment sheet

that they were not consistent with this study.

Field work:

After securing the official permissions to conduct the study, the fieldwork could start with the assessment phase, followed by planning and program design, then implementation and evaluation phases.

Assessment phase: This included collection of baseline data through interviewing using the developed questionnaire forms. The time taken to interview each woman was about 30 minutes. Two to four women were interviewed daily. The data collected was analyzed and served as a basis for tailoring the educational program according to the identified needs, and also for evaluation of the effectiveness of the program after its implementation.

Planning phase (program design): The investigators developed an educational program based on pertinent literature, and in the light of the findings of the assessment phase. The program was designed to be practical in nature, addressing cognitive, effective and psychomotor skills necessary to improve women's knowledge, attitudes and practices as regards osteoporosis. The same panel of experts reviewed the program to validate its form and contents. The program included five sessions 2-3 hours each. The first session was an orientation session to introduce the program and its goals and the manual prepared for this purpose. The second session covered osteoporosis definition, prevalence, and magnitude of the problem. The third session involved the risk factors, symptoms, complications, and diagnosis of osteoporosis. The fourth covered prevention and treatment. The fifth

session addressed practices related to diet, physical exercise type (walking, running, sporting, etc.) and time of practice, sun exposure, and calcium supplementation.

Implementation phase: The program was then implemented to study women in small groups of 8-10 women at the nearby primary care center, and sometimes at the house of one of them. As possible we tried to collect groups of homogenous age, groups of unmarried females, pregnant and lactating mothers or postmenopausal women were organized to address similar interests and needs. Teaching started by explanation of the program aim and procedures. Teaching integrated theory with practice, using simple language. Each session began with a revision of the previous sessions. The teaching methods included mini-lectures, small group discussions, demonstrations on posters, as well as open discussions. Teaching media as computer shows and short video clips on the educator's personal Laptop were used. Data was collected from 15/5/2010 to 15/1/2011.

Evaluation phase: Evaluation of women's changes in knowledge, attitudes and practices was done immediately at the end of the program, and three months later for follow-up. This was done using the same assessment tools.

Administrative and ethical considerations:

Official permissions were obtained from pertinent authorities to proceed with the study. Prior to embarking on the study, ethical approval was obtained from the Scientific Research Ethics Committee of Faculty of Nursing, Minia University. In addition, a written informed consent was secured from

each participant. Women sharing in the study were reassured about the anonymity and confidentiality of any information gathered. They were also informed about their right to withdraw from the study at any time. The study interventions are not expected to be associated with any harmful effects on the patients. Professional help was provided to participants as needed.

Statistical design:

Data entry and statistical analysis were done using SPSS 16.0 statistical software package. Qualitative categorical variables were compared using chi-square test. Whenever the expected values in one or more of the cells in a 2x2 tables was less than 5, Fisher exact test was used instead. To identify the independent predictors of woman's knowledge, attitude, and practice, multiple linear stepwise regression analysis was done after assessment for normality and homoscedasticity. Statistical significance was considered at p-value <0.05.

Results:

The age of studied women ranges between 30 and 61 years, with mean 33.1 years (**Table 1**). About two thirds of them are married (70.0%), have basic or intermediate education (65.3%), and slightly less than half of them are working (49.3%).

Concerning the symptoms and main complaints, **Table (2)** shows that the most common is back pain (48.7%) and other musculoskeletal problems. As for the risk factors, 11.3% have diabetes, 13.3% have amenorrhea, and 84.0% have a family history of osteoporosis. The intake of vitamins and tonics is low. The media are their main source of information (80.7%),

while only 13.3% reported health care providers as a source of information.

Women's knowledge about osteoporosis was low at the pre-intervention phase, particularly regarding its definition (32.7%), and diagnosis (31.3%) as shown in **table (3)**. However, the percentages of satisfactory knowledge increased significantly at the post-intervention phase, reaching 100.0% for the risk factors and prevention. At the follow-up phase, there were some declines in knowledge, but the levels remained statistically significantly higher than the baseline. In total, less than half of the women (49.3%) had satisfactory knowledge at the pre-intervention phase. This rose to 100.0% at the post phase and slightly declined to 94.0% at the follow-up phase.

Regarding women's attitude and practice, **table (4)** indicates generally high percentages of positive attitude and adequate practice at the pre-intervention phase. The only exceptions were related to the attitude towards tonics and vitamins (30.0%) and the practice of exercise (59.3%). At the post-intervention phase, statistically significant improvements were noticed in all areas of attitude and practice, with the exception of attitude towards diet and the practice of dairy intake. These two areas continued to be low at the follow-up phase, in addition to the attitude towards exercise. Overall, the percentages of total positive attitude increased from 92.0% at the pre-intervention phase, to 98.7% and 98.0% at the post and follow-up phases respectively, and of total adequate practice from 62.7% to 100.0% at the post and follow-up phases. These changes were all statistically significant.

In multivariate analysis (**table 5**), the attendance of the program was

the most important independent predictor of the scores of knowledge, attitude, and practice. Similarly, woman's work was a positive significant predictor of her knowledge and practice score, but a negative predictor of her attitude. The education level was also a positive predictor of the scores of knowledge and attitude. Age was a positive predictor of knowledge, and a negative predictor of attitude scores. Meanwhile, the married state and a higher knowledge score were positive predictors of the practice score. The models explain 55%, 42%, and 40% of the variations in the scores of knowledge, attitude, and practice, respectively.

Discussion:

This study showed that women lack knowledge and healthy practices related to osteoporosis, although they mostly have positive attitudes. The study hypothesized that an educational program would improve their knowledge, attitudes, and practices, and the findings lead to acceptance of this research hypothesis. In fact, they have shown significant improvements in all these three aspects, and this improvement was retained at the three-month follow-up.

The improvements in women's knowledge, attitude, and practices can be attributed to their attendance of the training program, as has been shown through the multivariate analysis, where the program was the most important independent predictor of the improvements in the three scores. This success is certainly due to the program content, which was tailored to women's needs, and procedures, which were based on the principles of adult learning and emphasized practical issues. Similar successes were previously reported in educational

programs based on needs assessment. In this regard, Green and Kreuter⁽¹⁵⁾ stressed that the use of population-based interventional approaches may be successful in decreasing the risk factors of osteoporosis, and in preventing the disease in the society. However, this success depends on a prior assessment of related knowledge, attitude, and practice in the community.

Our findings are in agreement with those of Abushaikha, Omran, and Barrouq⁽¹⁶⁾ who designed, implemented, and assessed the effectiveness of an educational intervention for osteoporosis among female school students in Jordan. The results demonstrated statistically significant improvements in their knowledge. On the same line, Francis et al,⁽¹⁷⁾ in a randomized controlled trial showed that osteoporosis prevention and self-management course improved osteoporosis knowledge, self-efficacy, self-management skills and behavior among attendants. A similar success was also reported by Chan and Ko⁽¹⁸⁾ who showed a similar success of a nurse-initiated educational program for prevention of osteoporosis.

The deficient knowledge revealed among the present study women before the intervention is expected given their socio-demographic background, where most of them had basic or intermediate education, and about one-third had rural residence, and more than half were housewives. In fact, the multivariate analysis demonstrated the effect of such variables on their knowledge, as well as their attitude and practice. The findings are in congruence with Filip and Zagórski⁽⁵⁾ who reported about the risk factors for osteoporosis in Poland. Their study

demonstrated significant differences between urban and rural women in these factors, and this was attributed to differences in socio-demographic characteristics.

According to the current study findings, most women had negative attitudes towards tonics and vitamins before the program. This might be explained by the deficient role of the health care providers as educators. In fact, only a few of the women mentioned them as sources of information regarding the problem of osteoporosis, while the majority reported the media as the main source. Similar findings were reported even in developed countries as in USA⁽¹⁹⁾ and Canada⁽²⁰⁾, where the television and radio played the most important role in this respect. The intervention led to improvement in this attitude, although this declined at the follow-up, but still remained better than the pre-intervention level.

Concerning women's practices, physical exercise was the lowest reported before the intervention, which is in congruence with previous research that revealed lack of physical activity as one of the main and most prevalent preventable risk factors of osteoporosis^(19, 21). The practice of exercise demonstrated significant improvement at both the post and follow-up phases of the present study. Conversely, their practice related to dairy intake did not show any improvements. This might be attributed to economic reasons since the practice of exercise can be done at no cost, while dairy products are relatively expensive in developing countries. Additional factors may influence the decision to consume milk and dairy products such as the taste, health concerns, choice of foods to satisfy other family members' needs

and preferences the finding is an agreement with Hammond and Chapman⁽²²⁾.

The deficient knowledge and inadequate practices of women in the current study, coupled with the prevalent proven risk factors as diabetes (11.3%) menopause (18.7%) and family history of osteoporosis (84%) could point to a high susceptibility to this disorder among them. In fact, about half of them (48.7%) complained of back pain, which is the most common symptom of osteoporosis. These findings are strengthened by previous reports that showed similar results.^(9, 23-25)

The present study findings revealed that the improvement in women's knowledge was associated with better practice scores, whereas the attitude scores were not independent predictors of practice. This implies that the inadequate practices were due to deficient knowledge rather than negative attitudes. The finding underscores the importance of the role of health care professionals as health educators, which seems to be inadequate according to the study findings. Previous studies have similarly shown the influence of knowledge practices related to osteoporosis.^(10, 26) On the other hand, and in disagreement with our finding, Hsieh et al.,⁽²⁷⁾ found a positive impact of attitude on preventive practices. The lack of effect of the attitude in the present study might be attributed to the fact that the attitude scores were overall high among women even at the pre-intervention phase.

Conclusion and recommendations:

The study concludes that an educational program based on needs assessment can be effective in improving women' knowledge,

attitude, and practices related to osteoporosis. Therefore, it is recommended to implement the developed educational program in communities where the risk factors of osteoporosis are prevalent, and where the knowledge about the disease is low as in rural Egypt. The role of health care professionals, including nurses, should be more activated in increasing awareness of the risk factors of osteoporosis and the simple preventive measures such as proper diet, physical exercise, and sun exposure. Future study is proposed to assess the long-term effects of the educational program, and its effect on the prevalence of osteoporosis.

Table (1): Socio-demographic characteristics of women in the study sample (n=150)

Item	Frequency	Percent
Age (years):		
<30	97	64.7
30-	30	20.0
50+	23	15.3
Range	16.0-61.0	
Mean± SD	33.1±11.0	
Marital status:		
Currently unmarried (single, divorced, widows)	45	30.0
Married	105	70.0
Education:		
Illiterate	19	12.7
Basic/intermediate	98	65.3
University	33	22.0
Job status:		
Housewife	76	50.7
Working	74	49.3

Table (2): Medical history and sources of information among women in the study sample (n=150)

Item	Frequency	Percent
Symptoms:[@]		
Back pain	73	48.7
Pain during walking	65	43.3
Joint pain	64	42.7
Menstrual problems	40	26.7
Myalgia	35	23.3
Risk factors:		
History of Diabetes	17	11.3
Practiced breastfeeding	112	74.7
Amenorrhea	20	13.3
Have family history of osteoporosis	126	84.0
Vitamins and tonics:		
Take Ca tablets	42	28.0
Take vit D tablets	39	26.0
Source of information:		
Media	121	80.7
Health care providers	20	13.3
Friends/relatives	9	6.0

(@) Not mutually exclusive

Table (3): Changes in women's knowledge about osteoporosis throughout the study phases

Satisfactory Knowledge (50%+)	Time						X ² Test p-value (pre-post)	X ² Test p-value (pre-FU)
	Pre (n=150)		Post (n=150)		FU (n=150)			
	No.	%	No.	%	No.	%		
Definition	49	32.7	118	78.7	109	72.7	64.31 <0.001*	48.14 <0.001*
Risk factors	64	42.7	150	100.0	146	97.3	120.56 <0.001*	106.73 <0.001*
Diet	131	87.3	148	98.7	149	99.3	14.80 <0.001*	17.36 <0.001*
Symptoms/signs	73	48.7	92	61.3	88	58.7	4.86 0.03*	3.02 0.08
Complications	79	52.7	146	97.3	128	85.3	79.80 <0.001*	37.42 <0.001*
Diagnosis	47	31.3	86	57.3	96	64.0	20.54 <0.001*	32.08 <0.001*
Management	109	72.7	147	98.0	144	96.0	38.46 <0.001*	30.91 <0.001*
Prevention	102	68.0	150	100.0	150	100.0	57.14 <0.001*	57.14 <0.001*
Total:								
Satisfactory	74	49.3	150	100.0	141	94.0	101.79	73.69
Unsatisfactory	76	50.7	0	0.0	9	6.0	<0.001*	<0.001*

(*) Statistically significant at $p < 0.05$

Table (4): Changes in women's attitude and practice towards osteoporosis throughout the study phases

Item	Time						X ² Test p-value (pre-post)	X ² Test p-value (pre-FU)
	Pre (n=150)		Post (n=150)		FU (n=150)			
	No.	%	No.	%	No.	%		
+ve attitudes to:								
Exercise	136	90.7	146	97.3	143	95.3	5.91 0.02*	2.51 0.11
Diet	142	94.7	147	98.0	145	96.7	2.36 0.12	0.72 0.39
Risk factors	106	70.7	141	94.0	142	94.7	28.07 <0.001*	30.15 <0.001*
Vitamins/tonics	45	30.0	121	80.7	98	65.3	77.90 <0.001*	37.54 <0.001*
Total attitude:								
Positive	138	92.0	148	98.7	147	98.0	7.49	5.68
Negative	12	8.0	2	1.3	3	2.0	0.006*	0.02*
Practices done:								
Exposure to sun	121	80.7	150	100.0	147	98.0	32.10 <0.001*	23.65 <0.001*
Exercise	89	59.3	149	99.3	149	99.3	73.19 <0.001*	73.19 <0.001*
Dairy intake	106	70.7	106	70.7	105	70.0	0.00 1.00	0.02 0.90
Fish intake	102	68.0	144	96.0	143	95.3	39.84 <0.001*	37.42 <0.001*
Total practice:								
Adequate	94	62.7	150	100.0	150	100.0	68.85	68.85
Inadequate	56	37.3	0	0.0	0	0.0	<0.001*	<0.001*

(*) Statistically significant at $p < 0.05$

Table (5): Best fitting multiple linear regression model for knowledge, attitude, and practice scores

Predictors	Un-standardized Coefficients		Standardized Coefficients	t-test	p-value
	B	Std. Error			
KNOWLEDGE					
Constant	33.077	3.601		9.186	<0.001*
Program (reference: pre)	30.233	1.449	.662	20.864	<0.001*
Job status (reference: housewife)	11.460	1.528	.266	7.502	<0.001*
Education (reference: illiterate)	2.452	.835	.097	2.937	0.003*
Age (years)	.162	.068	.082	2.360	0.019*
r-square=0.55		Model ANOVA: F=136.84, p<0.001			
Variables excluded by model (not significant): marital status, residence					
ATTITUDE					
Constant	90.320	1.349		90.320	<0.001*
Program (reference: pre)	8.000	.543	.533	8.000	<0.001*
Age (years)	-.148	.026	-.228	-.148	<0.001*
Education (reference: illiterate)	1.536	.313	.185	1.536	<0.001*
Job status (reference: housewife)	-2.223	.572	-.157	-2.223	<0.001*
r-square=0.42		Model ANOVA: F=79.73, p<0.001			
Variables excluded by model (not significant): marital status, residence, knowledge score					
PRACTICE					
Constant	2.028	.148		13.677	<0.001*
Program (reference: pre)	.726	.083	.453	8.754	<0.001*
Job status (reference: housewife)	.417	.063	.276	6.618	<0.001*
Marital status (reference:unmarried)	.195	.062	.118	3.127	0.002*
Knowledge score	.004	.002	.123	2.250	0.025*
r-square=0.40		Model ANOVA: F=136.84, p<0.001			
Variables excluded by model (not significant): age, residence, education, attitude score					

References

1. Parsons L.C. Osteoporosis incidence prevention and treatment of the silent killer. *Knurs Clin North Am.* 2005; 40(1): 119-33.
2. Melton L.J. Adverse Outcomes of Osteoporosis Fractures in the General Population. *Bone Miner Res.* 2003; 18:1139-41.
3. Mahmoud F., Nawaz H., Kassi M., Rehman R., Kasi P.M., Kassi M., Afghan A.K., and Baloch S.N. Determining the risk factors and prevalence of osteoporosis using quantitative ultrasonography in Pakistani adult women. *Singapore Med J.*2009; 50(1):20-8.
4. Lambing C.L. Osteoporosis, program and abstracts of the American Academy of family physician 2003 Annual Scientific Assembly. 2003; October 1-5; New Orleans, Louisiana.
5. Filip R.S. & Zagórski J. Osteoporosis risk factors in rural and urban women from the Lublin Region of Poland. *Ann Agric Environ Med.* 2005; 12(1):21-6.
6. Brown D.A. Osteoporosis- not just for women. *American Nurse Today.* 2009; 4(3): 10-12.
7. National Institute of Arthritis and Musculoskeletal and Skin Diseases

- [NIAMS]. National Institutes of Health. Osteoporosis overview. <http://www.niams.nih.gov>. Retrieved January 9, 2009.
8. Wallace L.S. Osteoporosis prevention in college women: application of the expanded health belief model. *Am J Health Behav.* 2002; 26(3): 163-72.
 9. Sallam H., Galal A.F. & Rashed A. Menopause in Egypt: past and present perspectives. *Climacteric.* 2006; 9(6):421-9.
 10. Werner P. Knowledge about osteoporosis: assessment, correlates and outcomes. *Osteoporosis Int.* 2005; 16(2): 115-27.
 11. Bonjour J.P. Invest in your bones—how diet, life styles and genetics affect bone development in young people, International Osteoporosis Foundation. [http://Osteofound.org/publication/pdf/invest in your bones](http://Osteofound.org/publication/pdf/invest_in_your_bones), 2006.
 12. Varena M., Binelli L., Zucchi F., Ghiringhelli D., Gallazzi M. & Sinigaglia L. Prevalence of osteoporosis by educational level in a cohort of Postmenopausal women. *Osteoporosis Int.* 1999; 9(3): 236-41.
 13. Larijani B., Hossein-Nezhad A. & Mojtahedi A. Normative data of bone Mineral Density in healthy population of Tehran, Iran: a cross sectional study. *BMC Musculoskeletal Discord.* 2005; 6(1): 38.
 14. Sedlak C.A., Doheny M.O., Jones S.L. Osteoporosis prevention in young women. *Orthop. Nurs.* 1998; 17(3): 53-60.
 15. Green L.W. and Kreuter M.W Health program Planning: An Educational and Ecological Approach, New York: McGraw-Hill, 2005: 67-80.
 16. Abushaikha L., Omran S. & Barrouq L. Osteoporosis knowledge among female school students in Jordan. *East Mediterr Health J.* 2009; 15(4):906-11.
 17. Francis K.L., Matthews B.L., Van Mechelen W., Bennell K.L., & Osborne R.H. Effectiveness of a community-based osteoporosis education and self-management course: a wait list controlled trial. *Osteoporos Int.* 2009; 20(9):1563-70.
 18. Chan M.F. & Ko C.Y. Osteoporosis prevention education programmed for women. *J Adv Nurs.* 2007; 54(2):159-70.
 19. Geller S.E. & Derman R. Knowledge, beliefs, and risk factors for osteoporosis among African-American and Hispanic women. *J. Natl. Med. Assoc.* 2001; 93(1):13-21.
 20. Juby A.G. & Davis P. A prospective evaluation of the awareness, knowledge, risk factors and current treatment of osteoporosis in a cohort study of elderly subjects. *Osteoporos Int.* 2001; 12:617-622.
 21. Baheiraei A., Pocock N.A., Eisman J.A., Nguyen N.D. & Nguyen T.V. Bone mineral density, body mass index and cigarette smoking among Iranian women: implications for prevention. *BMC Musculoskeletal Disord.* 2005; 24(6): 34.
 22. Hammond G.K. & Chapman G.E. Decision-making in the dairy aisle: maximizing taste, health, cost and family considerations. *Can J Diet Pract Res.* 2008; 69(2):66-70.
 23. Liu E.Y., Wactawski-Wende J., Donahue R.P., Dmochowski J., Hovey K.M., & Quattrin T. Does low bone mineral density start in post-teenage years in women with type 1 diabetes? *Diabetes Care.* 2003;26(8):2365-9.
 24. Silva H.G., Mendonça L.M., Conceição F.L., Zahar S.E., & Farias M.L. Influence of obesity on bone density in postmenopausal women.

- Arq Bras Endocrinol Metabol. 2007; 51(6):943-9.
25. Cortet B. Postmenopausal osteoporosis: general practitioners' application of the risk factors in the AFSSAPS guidelines. Survey of 2658 general practitioners. *Presse Med.* 2009; 38(9):1213-9
26. Yu S. & Huang Y.C. Knowledge of, attitudes toward, and activity to prevent osteoporosis among middle-aged and elderly women. *J Nurs Res.* 2003; 11(1): 65-72.
27. Hsieh C., Novielli K.D., Diamond J.J. & Cheruva D. Health beliefs and attitudes toward the prevention of osteoporosis in older women. *Menopause.*2001; 8(5): 372-76.



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