Knowledge Regarding Osteoporosis and Its Prevention among Non-Medical Academic Females

1 Fatma Aboul Khair Farag, 2 Ghada Hemdan Hamed

1 Assistant Professor of Maternal and Newborn Health Nursing, Faculty of Nursing, Fayoum University, Egypt
2 Lecturer of Maternal and Neonatal Health Nursing, Faculty of Nursing Modern University for Technology and Information, Egypt

DOI: https://doi.org/10.15520/ijnd.v9i12.2775

Abstract: Background: Osteoporosis is a growing health problem in countries with a rapidly expanding aging population especially among women. Satisfactory knowledge and practices regarding osteoporosis will encourage women to adopt measures to protect their bone health. A quasi-experimental one group pre-test post-test study aimed to assess the effectiveness of awareness program on knowledge and practices regarding osteoporosis and its prevention among non-medical academic females Fayoum University. The sample was consisting of 120 premenopausal female by using purposeful sampling technique. The tool was used as structured knowledge questionnaire. The pretest was conducted, and the planned teaching program was administered. The posttest was conducted after one week. The data obtained were analyzed by using differential and inferential statistics. The mean score of post-test knowledge 31.9 ±3.9 (58.3%) was apparently higher than the mean score of pre-test knowledge 17.5 ± 5.5 13 (83.3%) which ensures that the planned teaching program was effective in increasing the knowledge of the non-medical academic females regarding osteoporosis and its prevention. Moreover, the mean difference between pre-test and post-test knowledge score was found to be highly significant.

Key words: Knowledge -Osteoporosis and Its Prevention - Non-Medical Academic Females

INTRODUCTION

Osteoporosis (OP) is a debilitating chronic disease affecting females, where bones mass and quality are reduced. Bones become porous and brittle weaken the skeleton, and the risk of fractures increases significantly. Bone loss occurs “silently” gradually, often asymptomatic until the first fracture occurs, which is most common in the wrist, spine or groin [1].

Fractures of osteoporosis negatively affect woman’s quality of life and often result in pain, loss of function, inability to take care of self and others and to accomplish tasks and, in the worst case, death. In addition to the burden added to other family members and the poor state of the impact of the disease on relatives, where they must devote time and energy to help a family member lacking autonomy [2].

National osteoporosis awareness and prevention month is celebrating each May, and becomes a chance for becoming more familiar with the effects of this disease, and about the preventable steps that can reduce the lifetime risk of any osteoporotic fracture for about 40% to 50% for females and 13% to 22% for men worldwide. As well as in Egypt, based on different studies, it has been calculated that 53.9% of postmenopausal females have osteopenia and 28.4% have OP[3, 4]. On the other hand, 26% of men have osteopenia and 21.9% have OP[5, 6].

Being a woman is increasing risk for developing osteoporosis and broken bones, for a multiple reasons; why females are tending to have smaller, thinner bones than men. In addition, sharply decreases estrogen hormone, which protects the bone when females reach menopause. If premenopausal bone loss can be reduced, or potentially reversed, then this has important implications for the long-term prevention of osteoporosis and fracture. A decrease of only 10% in non-menopausal bone loss is predicted to delay the onset of osteoporosis by approximately 2 years.[7,8]

For many years, females reaching menopause have been advised to take Estrogen Replacement Therapy (ERT) or Estrogen with Progestin which called Hormone Replacement Therapy (HRT) to prevent this disease. However, this meant taking hormones for 20-30 years, which also has risks, including uterine cancer (with ERT alone), blood clots, gallstones, and possibly breast cancer.[9]

Osteoporosis is widely recognized as a preventable and treatable disease; therefore, an appropriate detection and management system that includes lifestyle modifications may minimize the burden on public health resources worldwide. Moreover, clinical guidelines recommend cessation of tobacco use, avoidance of excessive alcohol intake, participation in regular exercise, and an adequate intake of calcium and vitamin D for maintaining bone health[10]. Nursing professionals are the key link in the chain of multidisciplinary approach to the management of this potentially preventable disease, and in educating females about the various aspects of its evaluation and management[11].
**Significant of the study:**
The prevalence of osteoporosis is increasing and becoming one of the most prevalent and costly health problems among females. Although screening tests for osteoporosis are easily accessible, this condition remains undertreated. Females are four time more likely than men to develop this disease. According to the National Osteoporosis Foundation (NOF)[12], primary defense is important before the age of 30. It is evident in most of the cases that between the age of 30 and 40, one should start taking care to avoid osteoporosis.

In current situation, working females especially academic teachers will not give much attention to their health due to lack of time and other overload activities in their daily life (long standing or sitting, transportation, improper body mechanics through using teaching tools)[13]. Most often, they rely on junk or processed food instead of regular balanced diet, which has calcium, vitamin D and other minerals. As well as a way of sun as working inside institution for almost the day hours. For all these reasons, academic females are exposed to one of the most important causes of disability, pains, and burden of life cost. Osteoporosis awareness’, recognizing risk factors and taking appropriate action can have enormous positive impact on bone health in later years.[14]

Pre-menopausal females should strive to maintain their bone health by adopting good lifestyle choices and monitoring their secondary risk factors. Therefore, the current study aimed to assess the effectiveness of planned teaching program on knowledge regarding osteoporosis and its prevention among non-non-medical academic females, Fayoum University

**Aim of the study:**
The present study was conducted to fulfill the following aim:
Assess the effectiveness of planned teaching program on knowledge regarding osteoporosis and its prevention among non-medical academic females, Fayoum University through the following:
1. Assess the pretest knowledge score of the non-medical academic females about osteoporosis and its prevention.
2. Administer planned teaching program for non-medical academic females about osteoporosis and its prevention.
3. Determine the effectiveness of planned teaching program on osteoporosis and its prevention.

**Research Hypothesis:**
The current study hypothesized that:

There is significant difference between the pre-test and post-test knowledge scores regarding osteoporosis and its prevention among non-medical academic females.

**SUBJECTS AND METHODS**

**Research Design:**
A quasi-experimental research design (one group pre-test post-test research design) was used to achieve the aim of the current study.

**Setting:**
The study was conducted at four of non-medical faculties at Fayoum University.

**Subject:** A purposeful sample of 120 Pre-menopausal non-medical academic females, according to North American Menopause Society (NAMS) [15] most females experience menopause between ages 40 and 58. The average age is 51.
Physical changes begin years before the final menstrual period. This transition phase is called per-menopause and may last for 4 to 8 years.

**Tools for data collection:**
The **structured knowledge questionnaire**: it developed by researcher and consisted of two parts.

**Part -I**: It consisted of 13 items on personal and socio-demographic characteristics such as age, marital status, number of children, out of door activities, residence, educational qualification, years of working experience, working hours per day, body mass index, family history for osteoporosis, menstrual problems and source of information.

**Part -II**: it consisted of 30 knowledge items regarding OP definition, risk factors, complications and preventive measures guided by Facts on Osteoporosis Quiz (FOOQ) [16, 17]. This quiz (FOOQ) was generated based on the OP consensus conference of the National Institutes of Health in 2000.

**Scoring:**
The knowledge regarding the outcomes of program regarding osteoporosis and its prevention was scored as follows, one mark for each correct answer and zero marks for incorrect answer. The maximum score was 35, to interpret level of knowledge the score was distributed as follows; Interpretation of knowledge as:

- **Unsatisfactory knowledge (0-50 %)**,
- **Fair knowledge (51-75 %)** and
- **Satisfactory knowledge (76-100 %)**

**Tool Validity and Reliability:**
The validity of the tool was tested by offered to 5 academic expertise of adult and maternity from the faculty of nursing. To determine relevance, clarity, completeness and comprehensiveness of the tool, experts responses were either agree or disagree for the face validity. Then their opinions are reviewed and final tools were prepared and used. The reliability of the tools was measured through computation of internal consistency using Cronbach's alpha co-efficient as a measure of agreement between items and subscales

**Pilot Study:**
Pilot study was performed on 10% of nurses who met the selection criteria to investigate and ensure the feasibility, objectivity and applicability of the study, in addition to clarity, adequacy and internal consistency of the study tool to determine possible problems in the methodological approach or instruments. The tools were completed without difficulty and with no modification. Academic females who were involved in the pilot study were not excluded from the main study sample.

**Field Work and Procedure:**

**Administrative Design:** To carry out the study, an official permission obtained from the nursing faculty committee and
deans of selected faculties at Fayoum University. The study was carried out with full cooperation from academic staff of the different levels of authority (head of departments & classes organizer) after official letters were issued and explanation of the purpose and the method of the data collection for the study.

Field Work:
After obtaining official permission to carry out the study, the researchers were introduced themselves to the selected academic females who followed the criteria of premenopausal age and explained the purpose of the study. The oral consent was obtained from the participants. Each faculty alone. All enrolled academic females were asked to complete the self-administered questionnaire given to them after being provided with all information regarding the research and they were informed that participation in the study was totally voluntary. Privacy and confidentiality of data were assured through the research work. The data collection of the study was covered a period of four months from beginning of February 2019 and to the end of May 2019 in the previously mentioned settings. The aim of this study was achieved through the following phases: 1. **Assessment phase**, the researchers explain the aim of the study and collect data to preprogram knowledge and practice regarding osteoporosis and its prevention. 2. **Design educational materials phase**, the program was a lecture by using power point presentation and self-instructional brochures to raise the awareness towards osteoporosis prevention in Arabic language after reviewing recent related literature and revit it based on assessment phase. 3. **Implementation phase**, the educational lecture and hand out materials were distributed and discussed with participants within groups according their faculty schedule each group about10-12. 4. **Evaluation phase, this phase** accomplished by interviewing each participant to assess post program knowledge and practice almost about one week after completing the program.

**Statistical Design:**
The collected data were analyzed using (SPSS) version 20. Qualitative data was presented as number and percent, paired sample t-test. Relations between different qualitative variables were tested using correlation coefficient (person correlation). Probability (p-value) ≤ 0.05 was considered significant and < 0.001 was considered highly significant. While, > 0.05 was considered non-significant

**RESULTS**
The data was presented according to (description of socio-demographic variables of the respondents and findings related to knowledge scores of respondents on osteoporosis and its prevention

| Table (1) Personal and socio-demographic characteristics of the studied group (N=120) |
|---------------------------------------------------------------|
| **Characteristics**                                      | **Frequency** | **%**   |
|---------------------------------------------------------------|
| **Age**                                                     |               |        |
| - 35-39 years                                               | 12            | 10.0   |
| - >39-44 years                                              | 60            | 50.0   |
| - >44-48 years                                              | 30            | 25.0   |
| - >48-51 years                                              | 18            | 15.0   |
| **Marital Status**                                         |               |        |
| - Single                                                    | 10            | 8.3    |
| - Married                                                   | 100           | 83.3   |
| - Divorced                                                  | 6             | 5.0    |
| - Widow                                                     | 4             | 1.6    |
| **Number of Children**                                     |               |        |
| - No Children                                               | 16            | 13.3   |
| - 1-2                                                        | 74            | 61.7   |
| - 3-5                                                       | 25            | 20.8   |
| - >5                                                        | 5             | 4.2    |
| **Educational Qualification**                               |               |        |
| - Assistant Lecturer                                        | 13            | 10.8   |
| - Lecturer                                                  | 61            | 50.8   |
| - Assistant Professor                                       | 32            | 26.7   |
| - Professor                                                 | 14            | 11.7   |
| **Family Income/Month**                                    |               |        |
| - Enough and spared                                         | 22            | 18.3   |
| - Enough and not spared                                      | 71            | 59.2   |
| - Not enough                                                | 27            | 22.5   |
| **Body Mass Index**                                        |               |        |
| - Underweight                                               | 7             | 5.8    |
| - Normal Weight                                             | 76            | 63.3   |
| - Overweight                                                | 14            | 11.7   |
| - Obese                                                     | 23            | 19.2   |
| **Weekly Out Door Activity**                                |               |        |
| - Yes                                                       | 22            | 18.3   |
| - No                                                        | 57            | 47.5   |
| - In Frequent                                               | 41            | 34.2   |
| **Family History of Osteoporosis**                          |               |        |
| - Yes                                                       | 38            | 31.7   |
| - No                                                        | 82            | 68.3   |
| **Working Years**                                           |               |        |
| - 8 years                                                   | 20            | 16.7   |
| - >8-12 years                                               | 52            | 43.3   |
| - >12 years                                                 | 48            | 40.0   |
Table (1): showed that 50.0% of participants aged from >39-44 years old, and the majority of them were married. More than half of them have one to two child. About fifty percent of participant were lecturers, and all of them have more than eight daily hours working. A third of the participants have more than 12 years working at the university. About 73.3% of participant have no menstrual problems and about one third have family history for osteoporosis. 63.3% were from El-Fayum the university governorate and 59.2% of them reported that their family income was enough and not spared. Nearly half of them have no outdoor activities. And 63.3% of them have normal body weight.

Fig. (1) Illustrates the studied group previous sources of information regarding OP. The study showed that the majority of participants80% had information from social media as well as more than half get their information from mass media. While the minority of them get their information from family, colleagues, and reading respectively (40.0, 30.0) and the lowest percentage their knowledge were from medical care provider.

### Table (2) Participants’ Pre/Post Test Correct knowledge regarding Risk Factors of Osteoporosis (N=120)

| Risk Factors                                      | Pre test | Posttest |
|---------------------------------------------------|----------|----------|
|                                                   | N       | %        | N       | %        |
| - Advanced aging                                  | 81      | 67.5     | 120     | 100.0    |
| - Women more than men                             | 49      | 40.8     | 120     | 100.0    |
| - Being a white woman with fair skin             | 17      | 14.2     | 93      | 77.5     |
| - Having family history                           | 64      | 53.3     | 120     | 100.0    |
| - Being menopausal before 45 years or absence of period for 3 months | 63 | 52.5 | 120 | 100.0 |
| - Having big bones                                | 32      | 26.7     | 94      | 78.3     |
| - Over Eating                                     | 41      | 34.2     | 93      | 77.5     |
| - Having milk products                            | 70      | 58.3     | 120     | 100.0    |
| - Having calcium supplement                       | 33      | 27.5     | 120     | 100.0    |
| - Having vitamin D supplement                      | 12      | 10.0     | 120     | 100.0    |
| - Excessive exercise                              | 10      | 8.3      | 79      | 65.8     |
| - Eating dark green leafy vegetables              | 40      | 33.4     | 92      | 76.7     |
| - Smoking                                         | 78      | 65.0     | 120     | 100.0    |
| - Excessive drink soft drinks and cola            | 95      | 79.2     | 120     | 100.0    |
| - Excessive caffeine consumption                   | 48      | 40.0     | 120     | 100.0    |
Table (2) revealed the results regarding to participants’ pre/posttest correct knowledge regarding risk factors of osteoporosis, the participants had some correct knowledge before the program as excessive drink soft drinks and cola, to be away of sun exposure, advanced aging and smoking (67.5-65.0-79.2-67.5) respectively as preventive strategies for osteoporosis. More over their correct knowledge were improved from the majority to all of them regarding all aspects of preventing and controlling about risk factors.

**Table (3) Participants’ Pre/Post Test Knowledge Score Regarding Osteoporosis and Its Prevention (N=120)**

| Area of Knowledge                  | Max. Score | Pretest Mean ± SD | Posttest Mean ± SD | F     | P     |
|------------------------------------|------------|-------------------|--------------------|-------|-------|
| - Introduction and Definition of OP| 3          | 1.5 ± 0.2         | 2.6 ±0.3           | 23.8  | 0.00* |
| - Causes and Risk Factors.         | 7          | 4.1± 1.4          | 6.2±0.5            | 27.1  | 0.00* |
| - Signs and Symptoms               | 2          | 1.2 ±0.3          | 1.5 ±0.5           | 38.0  | 0.00* |
| - Diagnostic Examinations           | 3          | 1.5 ±0.6          | 2.5 ±0.2           | 41.8  | 0.00* |
| - Pathophysiology                  | 2          | 1.6 ±0.3          | 1.4 ±0.5           | 13.4  | 0.00* |
| - Complications                    | 3          | 0.5 ±0.5          | 2.3±0.7            | 41.1  | 0.00* |
| - Preventive Measures              | 17         | 7.1 ±2.2          | 15.4 ±1.2          | 26.86 | 0.00* |
| Total                              | 37         | 17.5 ±5.5         | 31.9±3.9           | 27.1  | 0.001*|

*Probability (p-value) ≤ 0.05 was considered significant and < 0.001 was considered highly significant.

**DISCUSSION**

The ability to recognize and control risk factors has become a cornerstone of modern medicine. Adopted exercise, healthier diets, and in some cases, prescription medication; Osteoporosis can be fought. Osteoporosis is widely recognized as a preventable and treatable disease; therefore, an appropriate detection and management system that includes lifestyle modifications may minimize the burden on public health resources worldwide.
The current study aimed to assess the effectiveness of planned teaching program on knowledge regarding osteoporosis and its prevention among non-medical academic females, Fayoum. As regarding the socio-demographic characteristics and personal data, the half of participant in middle age and the majority of them were married and have children which moreover they faculty members working more than eight hours daily. This indicates that this group is vulnerable to osteoporosis because of their functional and family burdens, as well as the distance from the sun, as known it is the main source of vitamin D in addition to that their daily preoccupation for more than 8 hours may lead to eating fast, incomplete or unhealthy meals.

When studying the residential area of some of the participants, it was found that they live in a province that is not the same as their place of work. This means that they suffer from the hardship of traveling, in addition to that, some of them have some problems of the menstrual cycle and one-thirds of the participants have a family history of osteoporosis. All of these characteristics of the participants made them keen in attending the program regularly and their responses to the data collection tool was complete credibility. This explains their utmost need to be a warned regarding OP.

The researchers agree on this study with[15], who studied the effect of osteoporosis health education program based on health belief model towards osteoporosis among jordanian female teachers, And found that the majority of the teachers as their work conditions and away from sun, as well as their personal characteristics' had “low perceived risk of OP before the program”. Which is completely different after the program.

Concerning the current study results’ regarding the knowledge of OP risk factors, the participants had some correct knowledge before the program as excessive drink soft drinks and cola, to be away of sun exposure, advanced aging and smoking. In compared with post program result of the vast majority have more information about all aspects as family risk, body mass index, exercise, causative medication, supplementations, and ovarian surgery.

Similar to the results of this study, other studies [16, 17&18] have seen that the sensitivity perceptions to osteoporosis among women in advanced age groups, away from sunlight, and more having soft drinks such as cola and caffeine put them on high risk for OP. In contrary to the results of this study, there were studies in which there was no difference in sensitivity perception [19, 20].The researchers noticed that sharing information on the disease in the education program and follow-up discussion about cases, and providing information and counseling on individual risks not raised the women's sensitivity perceptions regarding OP.

Regarding the effectiveness of the program in raising awareness regarding OP among female faculty members the current study revealed a highly significance difference between mean score of knowledge in comparing the pre-test mean score obtained by the respondents as 17.5 \( \pm \) 5.5 with posttest mean score obtained by 31.9 \( \pm \)3.9 in all aspect of osteoporosis knowledge and preventive measures.

This result is indicating that lectures, discussion and distributed self-instructional materials were effective in raising the awareness to importance of exercise, outdoor activists, Vitamin D&Ca supplemetations, dairy components, sun light and early screening very important to bone health. Especially with high risky women by advanced age, menstrual and family history of OP.

The program results were in contrast with [21] who found in his research regarding osteoporosis awareness among teachers as statistically significant increase among the intervention group with the majority of the teachers in the intervention group agreeing that their susceptibility to osteoporosis are high. This reflects that the majority of the intervention group believed that osteoporosis would significantly affect their lives. In addition, It is similar to with other studies suggested that education program increased perceptive susceptibility to osteoporosis.

On the other hand, the researches interpreted that personal characteristic of the study group as academics staff enhanced achievements as the effectiveness when comparing the results regarding definitions, complications, investigations and preventive measures when comparing percentages of satisfactory knowledge level before and after the program.

Regarding the previous program information among participant the current study revealed improper medical care provide (nurses and physicians) role in health education as they less source for participants to get their needed information regarding OP compared with social and mass media. Therefore, researchers considered interest in spreading health awareness through social media pages since it is the most used method. In addition medical care provider especially nurses should enhanced their role in health education.

The current study in contrast with the same finding reported by [22, 23] as they signifies the importance of television and social media as a universal source of health education regarding osteoporosis prevention knowledge by the participants.

**CONCLUSION**

This study concludes that there is improvement in the level of knowledge of non-medical academic females that indicates that the planned teaching programme was effective. The demographic variables of non-medical academic females significantly associated with the pretest knowledge score. The Current study results answered the hypothesis of development of planned teaching programme will help the non-medical academic females to enhance their knowledge.

**RECOMMENDATIONS**

The findings of current study recommended the need to raising women awareness toward osteoporosis including extent of the problem, risk factors, signs, complications,
diagnosis, bone building and preventive awareness especially for young, middle aged and elderly women. Further studies need to emphasize more strongly on the role of medical care provider (physicians and nurses) in health awareness regarding osteoporosis. As well as useful using of social media as it is preferable awareness tools among participants.

REFERENCES

[1]. International Osteoporosis Foundation (2011): Prevalence of Osteoporosis among Middle Aged Women in Chitwan District of Facts and statistics about osteoporosis and its impact. 2012. www.iofbonehealth.org

[2]. Papaioannou A, Morin S, Cheung AM, Atkinson S, Brown JP, Feldman S, Hanley DA, Hodsman A, Jamal SA, Kaiser SM, Kvern B, Siminoski K and Leslie WD (2010): clinical practice guidelines for the diagnosis and management of osteoporosis in Canada: summary. CMAJ 182:1864–1873

[3]. Guillemin F, Martinez L, Calvert M, Cooper C, Ganiats T and Gitlin M (2013): Fear of falling, fracture history, and comorbidities are associated with health-related quality of life among European and US women with osteoporosis in a large international study. Osteopors Int 24:3001–3010.

[4]. Facts and statistics about osteoporosis and its impact. 2012. www.iofbonehealth.org

[5]. Kalpana DS, Shankar D, Bijia A (2012) : Prevalence of Osteoporosis among Middle Aged Women in Chitwan District of Nepal.Intern J Phar & Bio Arch. ; 3(4):779-782.

[6]. Schuiling KD, Robinia K and Nye R (2011): Osteoporosis diagnosis, bone building and preventive awareness especially for young, middle aged and elderly women. Further studies need to emphasize more strongly on the role of medical care provider (physicians and nurses) in health awareness regarding osteoporosis. As well as useful using of social media as it is preferable awareness tools among participants.

[7]. Mithal A, Dhinra V and Lau E. Beijing (2009): China: an International Osteoporosis Foundation (IOF) publication; The Asian audit: Epidemiology, costs and burden of osteoporosis in Asia. www.iofbonehealth.org

[8]. El-Sayed MM and ElMegeid FY (2013); Osteoporosis-related life habits, knowledge and Attitude among group of female employees in King Saud University, World Applied Sciences Journal 22 (7): 919-925.

[9]. Hameed AA, Emam H, Fouad W and AbdelMohsen (2008): Evaluation of Health Education Intervention Program for Female Employees towards Osteoporosis, Journal of Applied Sciences Research, 4(7): 863-870

[10]. PuttapitakpongP, ChaikittisilpaS, PanyakhamlerdK, NimnuanC ,JaisamarnU and TaechakraichanaN (2014): Inter-correlation of knowledge, attitude, and osteoporosis preventive behaviors in women around the age of peak bone mass BMC Women’s health 14:35 available at www.biomedcentral.com/14726874/14/35.

[11]. Barzanji AT, Fahad AA and Mohamed AG (2013): Osteoporosis: A Study of Knowledge, Attitude and Practice among Adults in Riyadh, Saudi Arabia. J Community Health 38:1098–1105

[12]. Sayed S, Darweesh H, Fathy K, Mourad AM. Clinical significance of bone mineral density in Ankylosing Spondylitis patients: relation to disease activity and physical function. The Egyptian Rheumatologist 2015; 37:35–9.

[13]. Al-Shahrani FM, AlZahraniAM and Al-Haquawi AI (2010): Knowledge of osteoporosis in middle aged and elderly women. Saudi Med J; 31(6): 684-7.

[14]. Hassan RS, Bashour H and Koudsi A (2013): Osteoporosis knowledge and attitudes: a crosssectional study among female nursing school students in Damascus Arch Osteoporos 8:149 DOI 10.1007/s11657-013-0149-9

[15]. North American Menopause Society (NAMS):(2019) available at https://www.google.com

[16]. Zhang RF and Chandran M (2011): Knowledge of osteoporosis and its related risk factors among nursing professionals, Singapore Med J 52 (3):158

[17]. Laslett LL, Lynch J, Sullivan TR and McNeil JD (2011): Osteoporosis education improves osteoporosis knowledge and dietary calcium: comparison of a 4-week and a one-session education course. Int J Rheum Dis 14:239–247

[18]. Sanaeinasab H, Tavakoli R, Karimizarchi A, Amini ZH, Farokhian A, and Najarkolaei FR (2013): The effectiveness of education using the health belief model in preventing osteoporosis among female students EMHJ Eastern Mediterranean Health Journal Vol. 19 Supplement 3.

[19]. Varghese NM, Kumari V and Madanlal M (2013): Evaluation of Effectiveness of an Informational Booklet on Prevention of Osteoporosis in Terms of Knowledge, Attitude and Expressed Practices of Working Women, IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320–1959 p- ISSN: 2320–1940 Volume 2, Issue 5, PP 10-18

[20]. Shojaeizadeh D, Sadegh R, JavadTarrahi MJ, Asadi M, Safari H and Lashgarara B (2012): The effect of educational intervention on prevention of osteoporosis through Health Belief Model (HBM) in volunteers of Khorraramabad city Health centre. Annuals of Biological Research; 3 (1):300 307.

[21]. Zhang PY, Li XM, Wang DL, Guo XY and Guo X (2012): Evaluation of educational program on osteoporosis awareness and prevention among nurse students in China, Nursing and Health Sciences (2012), 14, 74–80.

[22]. Nirmal Singh;(2018) “Effectiveness of Planned teaching programmer on knowledge regarding osteoporosis and its prevention among school teachers in selected senior secondary schools in Udaipur city, Rajasthan.” IOSR Journal of Nursing and Health Science (IOSR-JNHS), vol. 7, no. 1, pp. 44-48.

[23]. Jehooni A, Hidarnia A, Kashfi SM, Ghasemi A, Askari A, A health promotion program based on the health belief model regarding women's osteoporosis. IntJ Musculoskeletal Pain Prev. 2016;1(1):7:e16.http://dx.doi.org/10.7508/ijmppp.2016.01.00