Dietary Awareness Range of Osteoporosis Disease and its Relationship to the Health Status for Public Education Teachers at Age Group between 40-60 Years Old in Al Madinah Al Munawwara
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ABSTRACT

Background: Osteoporosis is common in Saudi Arabia and the burden of management in an aging population will increase in coming decades globally osteoporosis constitutes a public health problem. There is still no national policy nor consensus on screening for this silent disease. **Objective:** The study was aimed to investigate the female teacher's awareness for osteoporosis and choices of food, nutritional awareness for osteoporosis, background of calcium and vitamin D and investigated how these factors could impact on their food choices and their bone health. **Methodology:** This study was carried out on 160 female teachers chosen from several secondary schools, Al Madinah Al Munawwarah, KSA, and ranged in age from 40-60 years. Data were collected using self-administered questionnaire consisting of socio-demographic, Health state, anthropometric, serum vitamin D and Dietary awareness Data collected to assess knowledge attitude and practice about osteoporosis. It included 14 questions which is about knowledge, attitude towards the disease Dietary awareness and prevention of osteoporosis. Evaluation done by giving each correct answer 1 and for wrong and don't know score of 0. **Results:** the most of female teachers 45% were suffering from overweight, and 25% of them were healthy weight, 20% of them were suffering from moderately obese, while 56.9% of them were not suffering from diseases, while about 43.1% of them were suffering from diseases, 13.4% of them were suffering from hypertension, and 8% of them were suffering from osteoporosis, and 6.7% of them suffering from, diabetes mellitus. the most of subjects 72.5% were suffering from vitamin D insufficiency , dietary awareness level in the study sample, the most of female secondary teachers 52.5% have middle level of dietary awareness, despite the fact that most of the teachers were of higher level of education are university graduates, while 38.1 % of them have high level of dietary awareness, and finally 9.4% of them have low level of dietary awareness, with mean value 10.01±2.16 correct answer/questions for all study sample. There is a statistically significant relationship between dietary awareness degree and health state at (P <0.01), also there is a statistically significant relationship between dietary awareness degree level of serum vitamin D. **In conclusion**: Osteoporosis knowledge was middle among Saudi female teachers, thus attitude and practices also low towards this disease. This finding is similar to other studies done in the kingdom in different cities, but there was no response. So this will enhance health authorities to create program to up raise the awareness of the community for this important disease, especially at primary health care levels and at school.

Key word: Osteoporosis, Saudi Arabia, female teachers, dietary awareness, menopause, vitamin D.

مدى الوعى الغذائى بمرض هشاشة العظام وعلاقته بالحالة الصحية لمعلمات التعليم العام للفئة العمرية من ٤٠- ٦٠ عاما بالمدينة المنورة

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الملخص العربى

مقدمة: هشاشة العظام مرض شائع في المملكة العربية السعودية وبخاصة في سن اليأس لدى النساء السعوديات ويجب أن يؤخذ بالاعتبار في المجتمع السعودي زيادته في العقود المقبلة، ويشكل هشاشة العظام مشكلة صحية عامة عالميا ، ولا يوجد حتى الآن سياسة وطنية ولا توافق في الآراء بشأن الكشف عن هذا المرض الصامت. **الهدف:** وتهدف الدراسة إلى دراسة ومعرفة وعي معلمات التعليم العام بهشاشة العظام واختيارات الطعام، والوعي التغذوي للمرض هشاشة العظام، والخلفية من الكالسيوم وفيتامين D، حيث بمعرفة الوعى يمكن التعرف على الأنماط الغذائية وصحة العظام لديهم. **المنهجية:** أجريت هذه الدراسة على ١٦٠ من المدرسات بالتعليم العام (الثانوى) تراوحت أعمارهن بين ٤٠- ٦٠ عاما تم اختيارهن من عدة مدارس ثانوية بالمدينة المنورة، المملكة العربية السعودية، وتم جمع البيانات باستخدام استبيان بالمقابلة الشخصية وتكون من عدة محاور شملت على المحاور الاجتماعية والديموغرافية والحالة الصحية، المقاييس الجسمية،قياس فيتامين D فى السيرم والوعى الغذائى بهشاشة العظام، وتم جمع البيانات الخاصة بالوعي لتقييم الموقف ومعرفة الممارسة حول هشاشة العظام لدى المعلمات، وقد تضمنت على أربعة عشر سؤالا وهي عبارة عن المعرفة والموقف من المرض الوعي الغذائي والوقاية من هشاشة العظام، وتم التقييم يتم من خلال إعطاء كل إجابة صحيحة ١ وللخطأ والذين لا يعرفون النتيجة صفر. **النتائج:** أظهرت النتائج أن معظم المدرسات بنسبة ٤٥٪ منهم يعانون من زيادة الوزن، وكان ٢٥٪ منهن وزن صحي، بينما ٢٠٪ يعانين من السمنة ، وبلغت نسبة المدرسات اللاتى لا تعاني من أمراض ٥٦.٩٪ ، في حين أن حوالي ٤٣.١٪ منهن يعانين من أمراض، تنوعت الأمراض بين نسبة ١٣.٤٪ منهمن يعانين من ارتفاع ضغط الدم، و ٨٪ منهن يعانين من هشاشة العظام، و ٦.٧٪ منهن يعانين من داء السكري. أما بالنسبة لنسبة فيتامين د فكانت معظم المدرسات بنسبة ٧٢.٥٪ يعانين من نقص فيتامين D ، أما بالنسبة لمستوى الوعى الغذائي بهشاشة العظام في عينة الدراسة فقد بلغت نسبة ٥٢.٥٪ من المعلمات لديهن وعى متوسط، على الرغم من أن معظم المعلمات ، في حين أن ٣٨.١٪ منهن لديهن مستوى عال من الوعي الغذائي، وأخيرا بلغت ٩.٤٪ لديهن مستوى منخفض من الوعي الغذائي، بتوسط حسابى بلغ ١٠.٠١ ± ٢.١٦ الإجابة الصحيحة /الأسئلة لجميع عينة الدراسة، كما دلت النتائج على أن هناك علاقة ذات دلالة إحصائية بين درجة الوعي الغذائي والحالة الصحية عند مستوى ($P < 0.01$)، وأيضا هناك علاقة ذات دلالة إحصائية بين درجة الوعي الغذائي مستوى من فيتامين D في السيرم. **ختاماً:** كان الوعى بهشاشة العظام متوسط بين العلمات السعوديات، وبالتالي الموقف والممارسات متوسطة الى حد ما نحو هذا المرض. هذه النتيجة مشابهة لدراسات أخرى أجريت في المملكة في مدن مختلفة، ولكن لم يكن هناك استجابة بنفس الدرجة. ولذلك فإن هذا سيعزز السلطات الصحية لخلق برنامج لرفع وعى المجتمع لهذا المرض الخطير، وخصوصا في مستويات الرعاية الصحية الأولية والمدرسية.

الكلمات الدالة (المفتاحية): هشاشة العظام، المملكة العربية السعودية، المعلمات، الوعى الغذائى، انقطاع الطمث، وفيتامين D.

INTRODUCTION

Osteoporosis is a disorder linked with ageing. It usually occurs in elderly people, especially postmenopausal females (Delmas and Fraser, 1999) Osteoporosis is one of three major chronic diseases found in the aged, including postmenopausal women. Menopause is associated with a reduction of estrogen secretion in women, resulting in decreased bone density that can lead to severe osteoporosis.(Hadji et al., 2007) Consequently, changes in appetite may occur due to menopausal factors such as gustatory changes as well as physiological and psychological changes such as depression. As a result, the nutrition status of postmenopausal women may be impaired specifically with regard to a micronutrients.(Bales et al., 1986) It has been reported that micronutrients, such as the metalloenzymes of certain proteins involved in collagen synthesis and skeletal structure formation, are essential for bone density maintenance.(Eaton, 1994).

Osteoporosis is associated not only with menopause, but also other factors such as ovariectomy, smoking, a lean body type, lack of exercise, deficient calcium intake, and excess intake of: animal protein, phosphorus, sodium, caffeine and alcohol. (Ilich and Kerstetter, 2000) Bone density is linked to nutrients, including certain minerals. (Chen et al., 2006) To date, there are several published studies analyzing the correlation between bone density and dietary patterns in postmenopausal women. The findings included the correlation of blood minerals such as calcium, phosphorus, magnesium, copper, zinc, and manganese with bone density. (Mongiorgi et al., 1990)., (Sojka and Weaver, 1995) A recent review article included a definition, etiologies, incidence of osteoporosis, and suggested possible dietary strategies for optimal bone health.(Cashman, 2007).

Estrogen is a female hormone that plays an important role in the health of women. One of its benefits is that it protects your bones and helps keep them strong and healthy. When estrogen levels drop, many women lose bone density. Teens and young women who often miss their periods usually have low estrogen levels. As a result, their bones may not be as strong. For midlife women, the drop in estrogen that happens with menopause can lead to rapid bone loss (National Osteoporosis Foundation, 2009).

Ali, et al., (2012) suggests that the ideal age for screening for low bone mass among the Saudi population should be earlier (55 years) than the ≥65 years in Western countries. Both quatitative ultrasound and dual-energy x-ray absorptiometry could be used for screening.

Many studies were carried out on Saudi population to find out the prevalence of low bone mass (osteoporosis and osteopenia) in Saudi Arabia is 70.5% in men and women with an average age of 56 years. This suggests that women in Saudi Arabia become osteoporotic earlier than the western women; hence it is recommended that if screening is to be mandated it should be around55 years of age (Ali, et al., 2012) see table (1).

Table (1): Studies with data on postmenopausal Saudi women

Studies	No. of patients	Age (y)	Methodology	Osteopenia n (%)	Osteoporosis n (%)
Al-Habdan et al.,(2009)	3311	55.6	Ultrasonography	948 (30.3)	720 (23)
Ardawi et al., (2005)	220	50-79[a]	DEXA	95 (43.4)	62 (28.2)
Sadat-Ali et al., (2004)	265	57.6	DEXA	79 (31)	107 (42)
ElDesouki., (2003)	830	59	DEXA	254 (30.6)	(328) 39.5
ElDesouki., (1999)	283	52-62[a]	SPA	(96) 34	68 (24)
Sadat-Ali et al., (1996)	150	54.1	SPA	68 (45)	60 (40)
Sadat-Ali et al., (1993)	110	58	Radiographs	46 (42)	45 (41)

DEXA: dual-energy x-ray absorptiometry, SPA: single photon absorptiometry. Age data are mean and standard deviation.[a] mean age and SD not available in the publication.

Osteoporosis risks can be reduced with lifestyle changes and sometimes medication; in people with osteoporosis, treatment may involve both. Lifestyle change includes diet and exercise, and preventing falls. Medication includes calcium, vitamin D, bisphosphonates and several others. Fall-prevention advice includes exercise to tone deanbulatory muscles, proprioception improvement exercises; equilibrium therapies may be included (Amani, 2013). Exercise with its anabolic effect, may at the same time stop or reverse osteoporosis. Osteoporosis is a component of the frailty syndrome. The prevalence of this disease is affected by the poor level of women knowledge, attitude and practice (Pande et al., 2005). Developing a right attitude towards osteoporosis may be a key determinant to improving health practices in order to prevent osteoporosis. General knowledge about osteoporosis not is adequate to change their attitudes toward osteoporosis, which could result in changing of osteoporosis preventive behaviors (Amani, 2013).

AIM OF STUDY

Most of studies carried out in Saudi Arabia studied osteoporosis among women, and ignored nutritional awareness. The study was aimed to investigate the female teachers's awareness for osteoporosis and choices of food, nutritional awareness for osteoporosis, background of calcium and vitamin D and investigated how these factors could impact on their food choices and their bone health

SUBJECTS AND METHODS

This study was carried out on 160 female teachers chosen from several secondary schools, Al Madinah Al Munawwarah, KSA.

1. **Data Collection:**

Data were collected using self-administered questionnaire consisting of socio-demographic, Health state, anthropometric, serum vitamin D and Dietary awareness.

1.1. **Socioeconomic Status:**

Data about age, marital status, family size, education level   family income habitation were done according to Park and Park, (1979).

1.2. **Health state**

Data about suffering from diseases, types of disease, taking medications, medications types, taking dietary supplements, dietary supplements types, time of taking vitamin D, regular menstrual cycle or not, and normal menstrual cycle or not.

2. **Anthropometric Measurements:**

Weight and height were measured with the subjects wearing light clothing, without shoes and recorded to the nearest 0.1 kg, and 0.1 cm, respectively. Arm circumference was recorded according to (Kuczmarski et al., 2000).

Body mass index (BMI) was determined based upon the established World Health Organization (WHO 1995) international anthropometrical references. Underweight (16 to 18.5 kg/m^2); normal weight (18.5 to 25 kg/m^2); and overweight ($>25kg/m^2$), obese Class I (moderately obese) (25- 35 kg/m^2), obese Class II (severely obese) (> 35- 40 kg/m^2), and Obese Class III (very severely obese) (> 40 kg/m^2) (Bellizzi and Dietz, 1999; World Health Organization, 2006)).

3. **Level of serum vitamin D:**

Serum vitamin D was determined among Saudi female teacher's women according to (Carter et al., 2004).

4. **Dietary awareness:**

Data collected to assess knowledge attitude and practice about osteoporosis among Saudi female teachers women attending data were collected by personal interview using well-structured questionnaire. It included 14 questions which is about knowledge, attitude towards the disease Dietary awareness and prevention of osteoporosis. Evaluation done by giving each correct answer 1 and for wrong and don't know score of 0.

5. **Statistical Analysis:**

Data were analyzed using statistical for social science (SPSS) program, version 16.0. (SPSS, 1998).

 RESULTS

Table (2) shows demographic characteristic of the study sample, the total number of study participants amounted to 160 females from secondary education teachers; most of them were recorded 85.6% at age group (40 – 49 years), while 14.4% were at age group (50 – 60 years) with mean age of 44.92±4.45 years. The majority of female secondary teachers were married,

91.2%, while the single female teachers were 3.8%, also 3.1% and 1.9% of them were divorcee and widow respectively.

As for number of children for female teachers, about 6% of them no had children, whereas 54.4% of them had between 6 to 9 children, and 32.5% of them had between 3 to 5 children, and 6.3% of them had between 1 to 2 children, finally 3.1% of them had more than 10 children, with mean 5.83±2.019. On the other hand education level, the majority of female secondary teachers 81.3% was university education, while 16.2% and 2.5% of them were degree of diploma and master, respectively.

The majority of female teachers 86.3% were intermediate family income (10000 to 15000 SR), while 13.7% of them were high income (more than 15000 SR). Moreover, the majority of female teachers 66.8% were lived in apartment while 53% of them were lived in villa.

Table (3) demonstrates anthropometric measurements of the study sample, the female secondary teachers 30% were recorded weights less than 65-75 kg, and 29.4% of them were more than 75 kg, while 27.5% were between 55-65 kg, and finally 13.1% were less than 55 kg, with mean value of weight 70.71±13.76 kg for all study sample. On the other hand, the most of female teachers 49.4% were recorded height between 155 - 165 cm, 33.7% of them were between 145 to 155 cm, and 14.4% of them were more than 165 cm, finally few subjects 2.5% were recorded less than 145 cm, with mean value of height 158.95±6.91cm for all study sample.

Based on BMI classification, table (3) showed that distribution of study sample, the most of female teachers 45% were suffering from overweight, and 25% of them were healthy weight, 20% of them were suffering from moderately obese, and 7.5% of them were suffering from severely obese, and 1.8% of them were suffering from very severely obese, finally 0.7% suffered from underweight, with mean value of body mass index $27.99±5.09$ kg/m^2 for all study sample.

Table (4) shows health state of the study sample, the total number of study participants amounted to 160 female secondary teachers; 56.9% of them were not suffering from diseases, while about 43.1% of them were suffering from diseases,13.4% of them were suffering from hypertension, and 8% of them were suffering from osteoporosis, and 6.7% of them suffering from, diabetes mellitus, and 1.3% of them suffering from cardiovascular disease and, while most of female teachers 70.6% of them suffering from others disease include; Parkinson, rheumatic, pain spine, joints roughness, peptic ulcer, anemia, tuberculosis, skin diseases, and colon.

As for taking medications, the female secondary teachers were 51.9% do not taking medications, while 48.1% of them were taking different medications, including: 25.9% were antibiotics and 15.6% were sedatives, 14.3% were diabetic drugs, and 12.9% were hypertension drugs, and 2.6% were diuretics, finally 28.7% were other drugs such as thyroxin hormone, rheumatic, and tuberculosis drugs.

The same table also illustrates, the female secondary teachers were 51.2% do not taking dietary supplements, while 48.8% of them were taking different dietary supplements including: 23.2% were calcium, also and 23.2% were calcium and vitamin d, 19.5% were vitamin d, finally 34.1% were others dietary supplements, such as iron, B12, and folic acid.

The female secondary teachers were 58.8% do not taking vitamin D as tablets or drops, while 41.2% of them were taking it. As for the time of taking vitamin D, The female teachers were 57.6% were taking sometimes, 24.2% of them were taking continuing daily, and finally 18.2% were taking vitamin D when prescribed by a physician.

On the other hand, most of female secondary teachers 96.6% were do not using estrogen hormone, while, 3.7% of them were using it. As for the menstrual cycle state, the majority of female secondary teachers 83.1% were the menstrual cycle have regular, while 16.9% of them were suffering from irregular it. Also 87.5% of the female teachers were characterizing by normal menstrual cycle, while 12.5% of them were suffering from abnormal it.

Table (5) shows level of serum vitamin D in the study sample, the majority of female secondary teachers 72.5% were suffering from vitamin D insufficiency, while 27.5% of them were suffering from vitamin D deficiency, with mean value of serum vitamin D 13.40±4.25 ng/ml for all study sample.

Table (6) shows Dietary awareness questions which were requested in the study sample, as shown 14 questions for nutrition awareness of osteoporosis were directed to female secondary teachers; it were as follows: what are causes of osteoporosis?, pregnancy and lactation have a role in osteoporosis?, what is the importance of providing milk and milk products for pregnant and breastfeeding women? , what is the role of protein in bone composition?, what is the amount of milk that you are need for calcium requirements in your age?, are bones are affected due to lack of estrogen hormone after menopause?, what are the best dietary sources of calcium?, what are factors that help to calcium absorption and should be available in the diet?, what is suitable time to sunlight exposure?, did you know that some medications such as cortisone, antacids and cramping have a role in osteoporosis?, is the movement, walking and working at school have a role in osteoporosis?, what is reason that makes smoking reduces bone density and weaknesses it?, what are the components of the full diet that must be available?, and the correct answer ratios were differed among themselves as shown in table 5.

Table (7) shows dietary awareness level in the study sample, the most of female secondary teachers 52.5% have middle level of dietary awareness, despite the fact that most of the teachers were of higher level of education are university graduates, while 38.1 % of them have high level of dietary awareness, and finally 9.4% of them have low level of dietary awareness, with mean value 10.01±2.16 correct answer/questions for all study sample.

Table (8) shows correlation matrix between health state and anthropometric in the study sample, there is a statistically significant relationship between health state and weight, also body mass index at (P<0.05).

Table (9) shows correlation matrix between health history and menstrual cycle state in the study sample, there is a statistically significant relationship between health history and menstrual cycle state at (P<0.01).

Table (10) shows correlation matrix between dietary awareness degree and health state in the study sample, there is a statistically significant relationship between dietary awareness degree and health state at (P <0.01), also there is a statistically significant relationship between dietary awareness degree level of serum vitamin D.

Table (11) shows correlation matrix between dietary awareness degree and anthropometric measurements in the study sample, there is no a statistically significant relationship between dietary awareness degree and anthropometric measurements (Weight, Height, and Body mass index).

DISCUSSION

It could be concluded from table (5) that most of subjects 72.5% were suffering from vitamin D insufficiency this result supported with Al-Turki et al., (2008) who reported that vitamin D deficiency among healthy young Saudi women of 25-35 years was 30% and 55% in women of > or =50 years. This study indicates that hypovitaminosis D is common in young and postmenopausal women. Efforts are require to augment and encouraged women for adequate exposure to sunlight and increased intake of fortified vitamin D products to maintain skeletal health.

In 2009 hypovitaminosis D was highly prevalent in a population of Swiss rheumatology patients (86%). We aimed to evaluate the evolution of vitamin D status in the same population two years later, after the results of the first study were disseminated to local physicians and patients, in order to determine the evolution of the problem and the impact of physician information (Stoll et al., 2013). We concluded that lower prevalence in hypovitaminosis D is certainly related to better adherence to daily supplements, and to better information and awareness of the physicians about hypovitaminosis. (Stoll et al., 2013).

It could be concluded from the results that dietary awareness level in the study sample, the most of female secondary teachers 52.5% have middle level of dietary awareness, despite the fact that most of the teachers were of higher level of education are university graduates. These results are in agreement with Tawfik, and Mousa (1995) who reported that nutrition knowledge about composition of a balanced diet are tissue building and protective groups of food. Rima et al., (2013) found that generally reveal poor knowledge about osteoporosis among female at Damascus. Integration of osteoporosis in school curricula and public education efforts is urgently needed. Nutrition education intervention was effective in improving calcium intake and retarding bone loss in the studied subjects (Hien et al., 2008).

Cross-sectional studies have varied in whether they have found an association between levels of osteoporosis knowledge and osteoporosis preventive behaviors (kasper MJ and JP, 2001). The results indicated that, there is a statistically significant relationship between dietary awareness degree and health state at (P <0.01), also there is a statistically significant relationship between dietary awareness degree level of serum vitamin D, Holick et al., (2005) reported that more than half of North American women receiving therapy to treat or prevent osteoporosis have vitamin D inadequacy, underscoring the need for improved physician and public education regarding optimization of vitamin D status in this population. A positive correlation between bone density and protein intake has been previously reported. (Kamel, 2006).

The results indicated that, there is no a statistically significant relationship between dietary awareness degree and anthropometric measurements (Weight, Height, and Body mass index). Holick et al., (2005) reported that women in this age group are in their critical period to enhance peak bone mass. Therefore, it is necessary to find effective education programs that have an influence over attitude and health preventive behaviors, as osteoporosis and its fracture consequences are preventable conditions.

Without the proper course of action and treatment, by 2050, the worldwide incidence of hip fracture in men is projected to increase by 310 percent and 240 percent in women. To help prevent the rising tide of fractures and their profound socio-economic impact on millions of people and communities throughout the Middle-East and Africa, we must all work to develop a healthy lifestyle and protect ourselves from osteoporosis (Al-Habdan et al., 2009).

In Saudi Arabia the magnitude of osteoporosis problem is not yet clearly weighed. In previous study; osteoporosis was more common among Type 2 diabetic postmenopausal Saudi females than the non-diabetics. Since both groups were postmenopausal, having equal percentage of Vitamin D deficiency, multi-parity, non-exposure to sun, lack of exercise and negligible milk intake, this concluded that the low BMD can be attributed to DM in the absence of other causes of osteoporosis (El-Desouki, 2005).

Study on osteoporosis in postmenopausal Saudi women using dual x-ray bone densitometry, concluded that bone densitometry should be used to assess the severity of bone loss, identify those who need therapy and for follow up and early diagnosis of those with osteopenia in order to institute proper therapy and avoid future osteoporosis (El-Desouki, 2003 , El-Desouki,2005).

Amani, (2013) reported that the study the age of participants in relation to their knowledge, of both elder women (>50 years) and younger ones (15 -19 years) were very poor in their knowledge this is similar to a study done in Pakistan; the knowledge on osteoporosis in younger women was found to be very poor compared to relatively older females. However, women belonging to higher socioeconomic status and better education had slightly more knowledge about osteoporosis compared to those with a low education level, regardless of age.

The nutritional problems in Saudi Arabia are mainly due to a change in food habits, illiteracy and ignorance, rather than a shortage of food supply or low income. Therefore, it is essential for all people to eat a balanced diet which will provide the dietary requirements of all nutrients. Perhaps behavior modification with respect to food intake will be effective in the treatment of underweight (Simopoulos, 1985).

CONCLUSION

In conclusion, Osteoporosis knowledge was low among Saudi ladies, thus attitude and practices also low towards this disease. This finding is similar to other studies done in the kingdom in different cities, but there was no response. So this will enhance health authorities to create program to upraise the awareness of the community for this important disease, especially at primary health care levels and at school.

RECOMMENDATIONS

Those involved in osteoporosis prevention may use these findings to implement secondary education - based food programs and nutritional health education messages with incorporation of skills for proper food choices, and emphasizing the importance of calcium and vitamin D and the importance of certain food items in prevention of Osteoporosis to female. Further studies involving females and other possible risk factors of osteoporosis are needed.

Table (2): Demographic characteristic of the study sample (n = 160)

Percent%	Frequency	Variables
Age groups (years)		
85.6	137	40 – 49
14.4	23	50 – 60
100	160	Total
44.92±4.45		Mean ± SD
Marital status		
3.8	6	Single
91.2	146	Married
3.1	5	Divorcee
1.9	3	Widow
100	160	Total
Having Children		
3.7	6	No
6.3	10	1 – 2 children
32.5	52	3 – 5 children
54.4	87	6 – 9 children
3.1	5	≥ 10 children
100	160	Total
5.83±2.019		Mean ± SD
Education level		
81.3	130	University
16.2	26	Diploma
2.5	4	Master
100	160	Total
Family income (SR)		
0	0	Low (< 10000)
86.3	138	Intermediate (10000 - 15000)
13.7	22	High (> 15000)
100	160	Total
Habitation		
33.2	53	Villa
66.8	107	Apartment
0	0	Rent
100	160	Total

Table (3): Anthropometric measurements of the study sample (n = 160)

%	NO.	Variables
Weight groups (kg)		
13.1	21	< 55
27.5	44	55-65
30	48	> 65-75
29.4	47	> 75
100	160	Total
70.71±13.76		Mean ± SD
Height groups (cm)		
2.5	4	< 145
33.7	54	145 - 155
49.4	79	> 155 - 165
14.4	23	> 165
100	160	Total
158.95±6.91		Mean ± SD
Body mass index BMI classification (kg/m^2)		
0.7	1	Underweight (>16 - 18.5)
25	40	Normal (healthy weight) (>18.5 - 25)
45	72	Overweight (> 25)
20	32	Obese Class I (Moderately obese) (25- 35)
7.5	12	Obese Class II (Severely obese) (> 35- 40)
1.8	3	Obese Class III (Very severely obese) (> 40)
100	160	Total
27.99 ±5.09		Mean ± SD

Table (4): Health state of the study sample (n = 160)

%	NO.	Variables
Suffering from diseases		
43.1	69	Yes
56.9	91	No
100	160	Total
Types of disease		
6.7	5	Diabetes mellitus
1.3	1	Cardiovascular disease
13.4	10	Hypertension
8	6	Osteoporosis
70.6	53	Others
100	75	Total
Taking medications		
48.1	77	Yes
51.9	83	No
100	160	Total
Medications types		
15.6	12	Sedatives
25.9	20	Antibiotics
12.9	10	Hypertension drugs
14.3	11	Diabetic drugs
2.6	2	Diuretics

28.7	22	Others
100	77	Total
Taking dietary supplements		
51.2	82	Yes
48.8	78	No
100	160	Total
Dietary supplements types		
23.2	19	Calcium
19.5	16	Vitamin D
23.2	19	Calcium and vitamin D
34.1	28	Others
100	82	Total
Taking vitamin D as tablets or drops		
41.2	66	Yes
58.8	94	No
100	160	Total
Time of taking vitamin D		
24.2	16	Continuing daily
57.6	38	Sometimes
18.2	12	When prescribed by a physician
100	66	Total
Using estrogen hormone		
3.7	6	Yes
96.3	154	No
100	160	Total
Regular menstrual cycle or not		
83.1	133	Yes
16.9	27	No
100	160	Total
Normal menstrual cycle or not		
87.5	140	Yes
12.5	20	No
100	160	Total

Table (5): level of serum vitamin D in the study sample (n = 160)

%	NO.	Variables
level of serum vitamin D (ng/ml)		
27.5	44	Deficiency (less 10)
72.5	116	Insufficiency (10 - 30)
-	-	Sufficiency (> 30 – 100)
100	160	Total
13.40±4.25 ng/ml		Mean ± SD

Table (6): Dietary awareness questions which were requested in the study sample (n = 160)

Wrong answer		Correct answer		Questions
Percent%	Frequency	Percent%	Frequency	
20.6	33	79.4	127	What are causes of Osteoporosis?
74.3	119	25.7	41	Pregnancy and lactation have a role in osteoporosis?
16.9	27	83.1	133	What is the importance of providing milk and milk products for pregnant and breastfeeding women?
30.6	49	69.4	111	What is the role of protein in bone composition?
68.1	109	31.9	51	What is the amount of milk that you are need for calcium requirements in your age?
٥.٦	9	٩٤.٤	151	Are bones are affected due to lack of estrogen hormone after menopause?
٣٣.١	٥٣	٦٦.٩	107	What are the best dietary sources of calcium?
٦٣.٧	١٠٢	٣٦.٣	58	What are factors that help to calcium absorption and should be available in the diet?
٢٣.٧	٨٣	٧٦.٣	122	Is it better to taking calcium tablets with vitamin D daily in your age
٤٨.١	٧٧	٥١.٩	83	What is suitable time to sunlight exposure?
26.2	41	73.8	119	Did you know that some medications such as cortisone, antacids and cramping have a role in osteoporosis?
٢٦.٣	42	٧٣.٧	118	Is the movement, walking and working at school have a role in osteoporosis?
36.2	58	63.7	102	What is reason that makes smoking reduces bone density and weaknesses it?
0.6	1	99.4	159	What are the components of the full diet that must be available?

Table (7): Dietary awareness level in the study sample (n = 160)

Percent%	Frequency	dietary awareness level
38.1	61	High (less 60%)
52.5	84	Middle (60% - 79.9%)
9.4	15	Low (more 80%)
100	160	Total
10.01±2.16		Mean ± SD

Table (8): Correlation matrix between health state and anthropometric measurements

Health state	Correlation	Weight	Height	Body mass index BMI
	Pearson correlation Sig. (2-tailed)	.-0.159* 0.045	-0.015 0.848	-0.159* 0.045

* correlation is significant at the 0.05 level (2-tailed).

Table (9): Correlation matrix between health history and menstrual cycle state

Health state	Correlation	Regular of menstrual cycle	menstrual cycle normal or not
	Pearson correlation Sig. (2-tailed)	-0214** 0.007	-0.205** 0.009

** Correlation is significant at the 0.01 level (2-tailed).

Table (10): Correlation matrix between dietary awareness degree and health state

Dietary awareness degree	Correlation	Health state	level of serum vitamin D
	Pearson correlation Sig. (2-tailed)	-0.017* 0.083	-0.069* 0.038

* Correlation is significant at the 0.05 level (2-tailed).

Table (11): Correlation matrix between dietary awareness degree and anthropometric measurements

Dietary awareness degree	Correlation	Weight	Height	Body mass index BMI
	Pearson correlation Sig. (2-tailed)	-0.061 0.447	-0.135 0.089	-0.013 0.873

* Correlation is significant at the 0.05 level (2-tailed).

REFERENCES

Al-Habdan, I.M., Sadat-Ali, M., Al-Muhanna, F.A., Al- Elq, A.H., and Al-Mulhim, A.A. Bone mass measurement using quantitative ultrasound in healthy Saudi women. A cross-sectional screening. Saudi Med J. 2009 Nov;30(11):1426-31.

Ali, M.S., Al-Habdan, I. M., Al-Turki, H. A., and Azam, M. Q. (2012). An epidemiological analysis of the incidence of osteoporosis and osteoporosis-related fractures among the Saudi Arabian population .Ann Saudi Med .

Al-Turki , H. A., Ali, S..M., Al-Elq, A. H., Al-Mulhim, F.A. and Al-Ali, A. K. (2008). 25-Hydoxyvitamin D levels among healthy Saudi Arabian women. Saudi Med J. ;29(12):1765-8.

Amani, A. O. (2013). Assessment of Osteoporosis KAP among women in Assir region, Saudi Arabia. Journal of Medicine and Medical Sciences Vol. 4(2) pp. 50-55.

Ardawi, M.S., Maimany, A.A., Bahksh, T.M,, Nasrat, H.A., Milaat, W.A., and Al-Raddadi, R.M.(2005) Bone mineral density of the spine and femur in healthy Saudis. Osteoporos Int. Jan;16(1):43-55.

Bales, C.W., Steinman, L.C., Freeland-Graves, J.H., Stone, J.M., and Young, R.K.(1986). The effect of age on plasma zinc uptake and taste acuity. Am J Clin Nutr.;44:664-669.

Bellizzi, M.C., Dietz, W.H. (1999). Workshop and childhood obesity, summery of the discussion. Am. J. Clin. Nutr. 70 (1): 173S – 175S.

Carter, G.D, Carter, R., Jones, J., and Berry, J. (2004). How accurate are assays for 25-hydroxyvitamin D? Data from the international vitamin D external quality assessment scheme. Clin Chem.;50:2195-7.

Cashman, K.D. Diet, nutrition, and bone health. (2007). J Nutr.; 137:2507S-2512S.

Chen, Y.M, Ho, S.C, Woo, J.L.(2006) Greater fruit and vegetable intake is associated with increased bone mass among postmenopausal women. Br J Nutr.;96:745-751.

Delmas, P.D. and Fraser, M. (1999) .Strong bones in later life: luxury or necessity? Bull World Health Organ; 77, 416–426.

Eaton-Evans, J. (1994). Osteoporosis and the role of diet. Br J Biomed Sci.. 51:358-370.

El-Desouki, M. (1999). Osteoporosis In Postmenopausal Saudi Women Using Dual X-Ray Bone Densitometry. Saudi Medical Journal;Vol. 20 (4):283-286.

El-Desouki, M.I.(2003). Osteoporosis in postmenopausal Saudi women using dual x-ray bone densitometry.Saudi Med J;24(9):953-56.

Hadji, P., Gottschalk, M., Ziller, V., Kalder, M., Jackisch, C.,Wagner, U. (2007). Bone mass and the risk of breast cancer: the influence of cumulative exposure to oestrogen and reproductive correlates. Results of the Marburg breast cancer and osteoporosis trial (MABOT). Maturitas.; 56:312-321.

Hien, V. T., Khan N. C. Mai, L.B., Lam,N.T., Phuong,T.M., Nakamori1,M., Yamamoto,S. Mai, T., and Nhung,B. (2008). Effect of community-based nutrition education intervention on calcium intake and bone mass in postmenopausal Vietnamese women Public Health Nutrition: 12(5), 674–679.

Holick , M.F., Siris, E., Binkley, N., Beard, Khan, A., M. Katzer, R. Chen, E., and Anne, E(2005). Prevalence of Vitamin D inadequacy among postmenopausal North American women receiving osteoporosis therapy. J. Clin. Endocrinol. Metab. 29;90(6):3215-24.

Ilich, J.Z., Kerstetter, J.E. .(2000).Nutrition in bone health revisited: a story beyond calcium J Am Coll Nutr.;19:715-737.

Kamel, H.J. (2006). Postmenopausal osteoporosis: etiology, current diagnostic strategies, and nonprescription interventions. J Manag Care Pharm.;12:S4-S9.

Mongiorgi, R., Gnudi S, Moroni, A, Bertocchi, G., Galliani, I., and Benfenati, L. (1990).Bone mineral alterations and Mg content in aging. Boll Soc Ital Biol Sper.; 66:623-630.

National Osteoporosis Foundation.(2009). Hormones and Healthy Bones National Osteoporosis Foundation Copyright 2009 National Osteoporosis Foundation.

Pande, K., Pande, S., Tripathi, S., Kanoi, R., Thakur, A., and Patle, S.(2005). Poor knowledge about osteoporosis in learned indian women. J assoc physicians india, 53:433-6.

Park, J. E. and Park, E. (1979). Text book of prevention and social medicine 7th ed. Hessers barner side Ph Riblisher. 1268 Napier Town. Pp: 81.

Rima ,S.H., Abazid, N., and Alourfi, Z. (2013). Relationship between 25-hydroxyvitamin D concentrations, serum calcium, and parathyroid hormone in apparently healthy Syrian people. Archives of Osteoporosis 12/2014; 9(1):176. PubMed.

Sadat-Al M, Al-Habdan, I, and Marwah ,S.(1996) Bone Mineral Density measurements of distal radius in Saudi Arabian females. Annals of Saudi Med, 16(4): 414-16.

Sadat-Ali M, El-Hassan, A.Y., and Ezzeldin, I.M. (1993).Postmenopausal osteoporosis in Saudi Women :A pilot screening. Annals of Saudi Med. 13: 272-74.

Sadat-Ali Sadat-Ali M, Al-Habdan I., Al-Mulhim Fatma, and Yousef, A. (2004) Bone Mineral density among postmenopausal Saudi Arabian women. Saudi Med J; 25(11):1623-25.

Simopoulos, A.P. (1985). Fat intake, obesity, and cancer of the breast and endometrium. Med Oncol Tumor Pharmacother;2:125-35.

Sojka, J.E., and Weaver, C.M. (1995).Magnesium supplementation and osteoporosis. Nutr Rev.;53:71-74.

SPSS. (1998). Statistical package for social science computer software, ver 16.0.

Stoll, D., Lamy, O., Hans, D., Zufferey, P., So, A., Krieg, M.A., and Aubry-Rozier, B.(2013). Changing the awareness of low vitamin D status in a rheumatology population: a pre/post-study. Swiss Med Wkly. 2;143:w13891. PubMed.

World Health Organization. (2006). BMI Classification. Global Database on Body Mass Index.