Knowledge, Attitude and Practice of Postmenopausal Osteoporosis among Females Aged 17-24 Years, Khartoum, Sudan

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Abstract

Background: Osteoporosis (OP), a metabolic disorder which affects mainly bones, is characterized by low bone mass and is associated with serious health and economic burden. The main musculoskeletal problems associated with it are hip fractures with a worldwide prevalence of about 1.6 million and high rates of morbidity and mortality. It is a silent disease and usually does not manifest until fractures occur. The Aim of this study were to assess knowledge, attitude and practice toward postmenopausal osteoporosis and its preventive measures among female students aged 17-24years in Khartoum, Sudan.

Methodology: A cross sectional study was conducted in three different faculties of the University of Khartoum. Data was collected from 226 female students aged 17-24 by stratified systematic random sampling using a pre-tested, pre-coded self-administered questionnaire.

Results: The majority (84.8%) of respondents heard about osteoporosis. Faculty curriculum was the main source of information (31.1%), followed by family and friends (15.3%). The overall knowledge of respondents about OP was below average (57.1%), average (42%) and good (0.9%). About three-fifth (58.1%) were aware about their susceptibility to get it in the future and (61%) were concerned about taking preventive measures. The majority of respondents (94.9%) perceived the seriousness of OP. Milk and dairy products were the most commonly identified as sources of calcium (33.8%).

Conclusions: The overall knowledge was below average. Raising knowledge about osteoporosis may be an effective tool in preventing the problem and subsequently osteoporotic fractures later in life.

Keywords: postmenopausal oosteoporosis, hip fractures, knowledge, attitudes, practice.

Introduction

Osteoporosis (OP) is an acquired disease characterized by reduced bone mass and deterioration of the micro-architectural structure of bone tissue, leading to increased bone fragility and susceptibility to fractures (Kumar et al; 2013) . World Health Organization (WHO) defines osteoporosis as a bone mineral density of 2.5 standard deviations or more below the mean peak bone mass as measured by dual-energy X-ray Absorptiometry (DEXA scan) (Dontas et al; 2014).

Bone loss in osteoporosis may be confined to certain bones and regions or to be generalized. Generalized OP may occur as a primary disease or secondary to a variety of diseases including metabolic diseases, vitamin deficiencies and drug exposure. Primary OP is the most common form and may be associated with aging. In both men and women OP begins in the third or fourth decade of life when a dynamic balance between bone formation and bone resorption tilt in favour of resorption the bone loss averaging 0.5% per year occurs mostly in areas containing the abundant trabecular bone. The decline in oestrogen levels associated with the menopause in females correlate with an acceleration of cortical and trabecular bone loss. Over 30 to 40 years this can result in loss of up to 35% of cortical bone and 50% of trabecular bone which leads to postmenopausal women suffering

from osteoporotic fractures. It appears that the post-menopausal drop in oestrogen leads to increased cytokines production this stimulate (RANK-RANK Ligand) activity and suppress Osteoprotegrin (OPG) production that increases osteoblastic activity. The risk of primary osteoporosis is related to peak bone mass earlier in life which is influenced by genetic, nutritional and environmental factors (Dalsky et al; 1988).The disease is usually manifested clinically as fracture that affects and burdens the hip, vertebral column, wrist and other peripheral bones. Diagnosis can be made using radiological studies and by measuring bone mineral density by dual energy x-ray absorptiometry.

Primary OP can be prevented by lifestyle modifications, use of certain medications or both. Life style modification includes education of the people and persuading them to do regular exercise, reduces weight, take a balanced and healthy diet and quit smoking and alcohol (Dalsky et al; 1988). Calcium and vitamin D supplements are used in high risk individuals other drugs include oestrogen replacement therapy for prevention of OP but it is not recommended unless there are other indications for its use because of its associated side effects (Kumar et al ;2013). Worldwide, OP causes more than 8.9 million fractures annually or an osteoporotic fracture every 3 seconds (Johnell et al; 2006). According to the International Osteoporosis Foundation, OP is estimated to affect 200 million women worldwide. Although OP is a silent disease it can be prevented, early diagnosed and treated. The level of awareness about the disease's risk factors and preventive measures is an important factor in decreasing osteoporotic fractures. There is observable increase in osteoporotic fractures among postmenopausal females in low income countries and the Middle East (Morales et al; 2007).

A cross sectional study was conducted in 2013, to evaluate KAP of OP among male and female students in a Malaysian university. The research reported higher levels of knowledge among females compared to males (Y.H.Khan et al; 2014). Another study in Pakistani female university students concluded that, about (82.1) percent of participants had good knowledge about the disease (Noman-ul-Haq et al 2015). The awareness level of Indian female students regarding the disease was low (Mukesh et al; 2007). A campaign among King Abdul-Aziz University students in the Kingdom of Saudi Arabia (KSA) showed that the majority of students (77%) had high scores of knowledge about the disease (Ghadeer and Haytham; 2015).

OP was not integrated in the educational curricula in the majority of Arab countries (Dontas et al; 2007). A more focused survey involved 353 female nursing students in Damascus identified general knowledge about OP as poor and that it was not included in the faculty curriculum (Rima et al;2013).

A cross sectional study in the KSA targeting adult women showed higher levels of knowledge among the young, those of low socioeconomic status and housewives, while more than half (55%) of respondents showed good attitude toward OP. In practice, however, only (18.2) percent were exposed to sunlight, (35.4) percent performed exercise, (41.5) percent consumed soft drinks and (50.8) percent ate calcium rich foods (Kh. Eltohami et al; 2015). A KAP survey done in Kerman, Iran indicated insufficient knowledge, adequate protective exercise and insufficient calcium intake (Z. Jalili et al; 2007). An Egyptian study revealed poor knowledge and attitude with no differences between males and female (Hala et al; 2015). In a further study in Iran the mean awareness score was 11.7 from an overall score of 19, it was reported as not good and significantly higher levels knowledge was found among participants with higher educational levels (MansourehSafizadeh et al; 2015).

Hip fractures in the Middle East and Africa fall in the lower third of the scale worldwide. Only about 0.98% of the global publications about OP were from Arab countries (waleed et al; 2014).

Objectives

The general objective **was to study the knowledge, attitude and practice (KAP) toward postmenopausal OP among female university students aged 17-22.**

The specific objectives **were to:**

1. Assess knowledge about postmenopausal OP
2. Explore attitudes toward preventing it.
3. Identify practice of preventive measures

Methodology

Research design

Descriptive cross-sectional study.

Study area

Faculties of Medicine, Nursing and General Environmental Health of the University of Khartoum.

Study population

total population was 2149 female students.

Inclusion criteria were Sudanese female students, aged 17-22 that formally registered. Exclusion criteria were those who refused to participate in the study.

Sample size

Up to our knowledge there was no published data about prevalence of OP in Sudan, hence, 28.4% of neighbourhood country (Egypt) was used (IOF; 2011).

It was calculated according to the equation:

$n = \dfrac{N\,z^2 p(1-p)}{N\,d^2 + z^2\,p\,(1-p)}$ Where:

n= sample size

N= total number of population (2149)

z=z value (e.g. 1.96 for 95% confidence level)

d= Desired margin of error, expressed as decimal (0.05)

P= Prevalence of the disease (28%)

n = 270

Only 226 students were responded

Sampling selection technique

Stratified systematic random proportional to the number of students in each faculty and academic year was used. Each faculty was considered as stratum. Proportional to the number of female students in the 3 faculties, the appropriate number of students was assigned to each faculty and accordingly to each academic year using the formula: $ni = \dfrac{Ni}{N} * n$

Students from each class were selected by systematic random sampling in both medicine and nursing faculties. However, students from faculty of general health were selected conveniently due to the unavailability of student list during the time of study.

Data collection tool

Pre-tested, pre-coded self-administered questionnaire modified from the Malaysian Osteoporosis Prevention and Awareness Tool (OPAAT) composed of 4 parts (Toh LS et al; 2015).

Data management

Data was analysed using SPSS version 21. Percentages were computed. Chi square test was used to assess difference between proportions. A scoring system was used by giving correct answers one mark.

Ethical consideration

Ethical clearance was obtained from the Faculty of Medicine, University of Khartoum Research Committee. Verbal consent was obtained from each participant following clarification that the confidentiality of the data would be observed.

Results

Background data

Two hundred and twenty six students responded to the questionnaire. A majority of (70%) were studying medicine, (12.4%) nursing and (17.3%) were environmental health students. About two third (64.4%) were during their intermediate and post intermediate academic years (second to fourth years). The overwhelming majority (97.8%) were single however; participants were almost equally distributed according to the economic status, family income-per month in SDG; (55.5%) less than 4000 and (44.4%) 4000 and more (table 1).

Table 1. Distribution of respondents according to background data.

1.	Faculty	n	%
	Medicine	159	70.3
	Nursing	28	12.4
	Environmental Health	39	17.3
	Total	**226**	**100.0**
2.	**Academic year**		
	Year 1	25	11.1
	Year 2	50	22.2
	Year 3	46	20.4
	Year 4	49	21.8
	Year 5	42	18.7
	Year 6	13	5.8
	Total	**226**	**100.0**
3.	**Marital status**		
	Single	221	**97.8**
	Married	5	**2.2**
	Total	**226**	**100.0**
4.	**Family income/month in SDG**		
	< 2,000	**37**	22.8
	2,000-<4,000	**53**	32.7
	4,000 and more	**72**	44.4
	Total	***162**	**99.9**

*64 students did not answer this question about family income

Sources of information
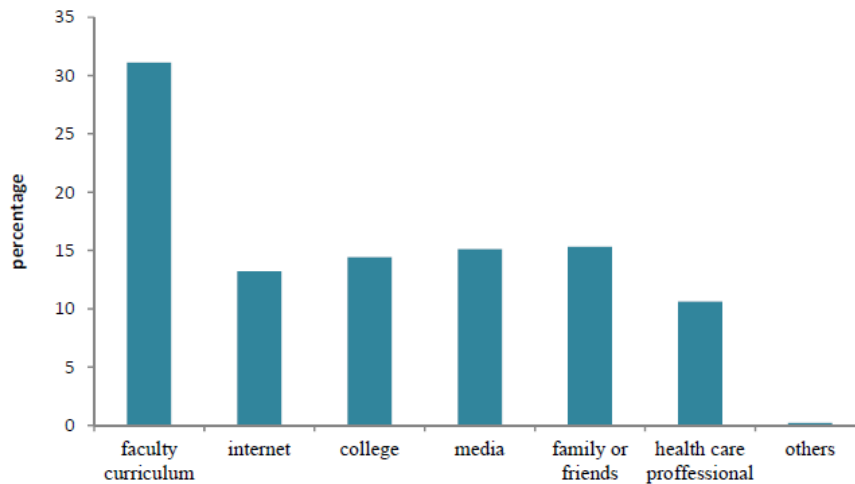
Figure 1. Sources of information of respondents who heard about OP

Figure 1 shows sources of information of respondents who heard about OP. Faculty curriculum was the most common source (31%), then family/friends, college, media, internet and health professional (about 10-15% each).

Correct knowledge

Table 2 shows the distribution of respondents by their scores of correct knowledge of OP. Scores ranged between 84.5 percent for, OP making bones weaker, brittle and more likely to break causing fractures to 9.7 percent for untreated OP resulting in loss of mobility.

Table 2. Distribution of respondents by their scores of correct knowledge of OP.

No	Question on knowledge of OP	Correct response	
		n	**%**
1.	Makes bones weaker, brittle and more likely to break (fractures)	191	84.5
2.	Everybody will get osteoporosis as it is part of aging.	88	38.9
3.	The probability of osteoporosis is equal in men and women.	139	61.5
4.	Post-menopausal women are not at risk for osteoporosis.	157	69.5
5.	Osteoporosis usually has no symptoms	42	18.6
6.	Consumption of cortisone for ≥ three months can lead to osteoporosis.	66	29.2
7.	Genetic factors have no relationship with osteoporosis.	105	46.5
8.	Being underweight helps prevent osteoporosis.	74	32.7
9.	Weight bearing exercise (e.g. jogging) decrease bone loss.	111	49.1
10.	Smoking increases the risk of osteoporosis.	98	43.4
11.	Osteoporosis is an untreatable disease	110	48.7
12.	A bone mineral density test is used to diagnose osteoporosis.	106	46.9
13.	Premenopausal (< 45 years) are more likely to get osteoporosis	93	41.2
14.	The skeleton riches its maximum strength at 20sYears of age.	99	43.8
15.	Untreated osteoporosis results in back pain	141	62.4
16.	Untreated osteoporosis results in loss of height or hunchback	96	42.5
17.	Untreated osteoporosis results in joint pain or swelling of fingers.	33	14.6
18.	Untreated osteoporosis results in Hip fractures	168	74.3
19.	Untreated osteoporosis results in loss of mobility	22	9.7
20.	Untreated osteoporosis results in Calles's (wrist) fractures	129	57.1

21.	There is no way to prevent osteoporosis	157	69.5
22.	Recommended daily amount of ca. increases in females after 50	120	53.1
23.	It is too late to increase calcium intake after the age of 50.	59	26.1
24.	Calcium supplement helps in prevention of osteoporosis.	162	71.7
25.	The regular dose of calcium supplements can cause kidney stones.	76	33.6
26.	Daily intake of vitamin D is obtained by daily exposure to sunlight	141	62.4
27.	Decreasing intake of carbonated drinks help in disease prevention.	128	56.6

Overall knowledge

The overall knowledge of respondents about OP revealed the following ranges of scores:

The total score for each respondent was calculated. A cut of level (≤ 15) was considered as below average knowledge, (16-21) as average knowledge while a total score of (≥ 22) was considered as good. Out of the total score of (27) marks the mean total score of knowledge was calculated (12.88 ± 6.23).

Knowledge about dietary sources of calcium showed that milk and dairy products were the most commonly identified source (33.8%), followed by dates (16.6%), greens vegetables (15.7%), tuna and sardines (13.7%). Dried fruits, nuts and sasame were the least identified source, 11.2% and 9%, respectively.

Attitudes

The majority of respondents (94.9%) perceived the seriousness of OP. About (58%) were aware about their susptibility to it and (61%)were concerned about taking preventive measures. Increasing the dietary intake of calcium (23.9%) and decreasing the consumption of carbonated drinks (22.5%) were the most preferred preventive behaviours.

Practice

The practice of certain lifestyle habits that affect future risk of osteoporosis shown in

Table 3 Shows the practice of certain lifestyle habits that affect future risk of OP

The practice of preventive behaviours revealed that four fifths (80.0%) of respondents consumed calcium and vitamin D rich foods, about one third (31.1%) performed weight bearing regular exercise and about three fifths (58.4%) were usually exposed to the sun. The practice of risk behaviours showed that about three quarter (71.8%) do not consume carbonated drinks, less than one tenth (8.4%) were cortisone users and (0.9%) were smokers.

Table 3. Practice of certain lifestyle habits that affect future risk of OP

Behaviour/Life style habit		Positive practice	
		n	**(%)**
1. Preventive	1.1 Calcium intake	181	80.0
	1.2 Weight bearing	68	(31.1)
	1.3 Exposure to sunlight	129	(58.4)
	1.4 Not consuming carbonated drinks	62	(28.2)
2. Risk	2.1 Cortisone use	19	(8.4)
	2.2 Smoking	2	(0.9)

Discussion

This study was conducted to assess KAP toward postmenopausal OP among female university students. The young sector of the community is amenable to behavioural change because it is at the age of peak bone mass which positively affects the risk of the disease (Juan et al; 2014) furthermore, university students are catalysts in raising community awareness.

Results revealed that more than half (57%) of the respondents had insufficient knowledge about the disease. Similar results were reported among female students in Damascus (Rima et al; 2013). However, good knowledge (82.1%) about OP was reported among female student in Malaysia (Y. H. Khan; 2014). These results seemed to indicate that the level of knowledge about OP among this sector of the population were contrary to expectations. This might be due to lack of available sources of knowledge for this at risk sector (Ghadeer and Haytham; 2015). The most common source of information about OP was the curriculum, followed by family or friends, while the least was health care professionals, the media and internet. Involvement of health care professionals in delivering information about the disease was noticed among women of older ages in USA (Stacie et al; 2001) and Egypt (Sara et al; 2016).

Being female and the postmenopausal state were the non-modifiable risk factors that known by the respondents, 61.5% and 69.5%, respectively. This does not agree with other studies which had shown poor knowledge about non-modifiable risk factors (Noman-ul-Haq et al; 2015).

Overall good knowledge about modifiable risk factors was shown by respondents (despite poor knowledge about smoking and regular use of cortisone), higher than that reported in previous studies in Syria (Rima et al; 2013) and Malaysia (Y.H.khan et al; 2014).

It is worthy to note that the age of peak bone mass is more encouraging for adopting preventive practice against OP; but, unfortunately, a considerable number of respondents did not know this. Similar results were observed in Indian females (Mukesh et al; 2103). As vitamin D is one of the important determinants for development of bones during childhood and adolescence (Hreybe et al; 2004), exposure to sunlight is considered important and was assessed in this study. Interestingly about 10.7% of respondents were never had enough exposure to sunlight as they mentioned which put them at risk of developing hypovitaminosis D and hence OP. On the other hand (57.8%) of respondents were exposed enough to sunlight this rate is higher than 18.2% reported in Saudi females (Kh. Eltohami et al; 2015) and lower than 88.2% reported in Iranian females (Z. Jalili et al; 2007). Exposure of Sudanese females is below expectations as sufficient sun light is available throughout the year in Sudan.

Weight bearing exercises were performed by only one third of our respondents which is higher than that reported by comparable studies (Kh. Eltohami et al; 2015; Z. Jalili et al; 2007).

There was no association observed between the level of knowledge and practice of exercise.

Four fifths (80.0%) of respondents consumed calcium and vitamin D rich foods this might be be linked to Sudanese diatry cultural practice rather than knowledge translation. Only about one fifth of respondents had adequate calcium intake. Similarly, a low level was reported in Iran (Morales et al; 2007).This might be attributed to difference in economic and cultural factors such as the lack of interest toward knowing about micronutrient compositions of different types of foods and unavailability of nutritional fact sheets for Sudanese foods.

5.2. Conclusions

Overall knowledge was below average and respondents were unaware of the risk factors and Consequences of OP. Raising knowledge may be an effective tool for preventing OP, osteoporotic fractures and other sequels.

Recommendations

Mass ccampaigns are essential in universities to raise the awareness about the OP. Development of nutritional fact sheets for Sudanese food and make them accessible especially for the for young females who are at the age when preventive measures against OP are most effective. Further research involving wider sectors of the community is required

Limitations

- The response rate of answering the self-administered questionnaire was 56.5 percent because they were busy with studying and doing their clinical hospital based rounds.
- Sixty four (28.3%) students did not answer the question about family income because they were not directly involved with their families' sources of money.

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