Nurses Health Beliefs and Their Preventive Measures Regarding Osteoporosis: Comparative Study

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Abstract **Background:** Osteoporosis is one of the most common bone metabolic disorders which have been associated with significant disability and mortality. Osteoporosis has been recognized as a major public health problem by nurses' providers in Egypt. Therefore, this study aims to compare between nurses' health beliefs and their Preventive Measures regarding osteoporosis in Egypt and Sudan. **Method: A** descriptive research design was used in the current study. **Setting:** The study was conducted in internal medicine and orthopedic units and medical and orthopedic out patients' clinic at three hospitals affiliated to the Ministry of Health named Port-Said General Hospital, Port -Fouad General Hospital, and El-Zohor central Hospital. In addition to out- patient Clinics (MCH center) at Khartoum, Bihari and Omdurman in Sudan country. **Sample**; A convenient sample used for this research which consists of all nurses working in the previous mentioned settings, total number of 170 nurse, distributed as the following; 90 from Egypt and 80 from Sudan from different hospital specialties were included in the study. **Tool;** questionnaire about preventive measures regarding osteoporosis and osteoporosis health beliefs scale (OHBS) were used for collecting data of the current study. **Results;** the study results revealed significant differences between Egypt and Sudan regarding some subscales of health beliefs regarding osteoporosis as susceptibility, seriousness, barrier of calcium intake and health motivation with P-value of 0.027, 0.013,059 and 0.024 respectively. However, there were no significant differences between both countries regarding nurse action to prevent osteoporosis. **Conclusion:** there were no significant differences between Egypt and Sudan regarding preventive measures applied by nurses to prevent osteoporosis in spite of the significant differences between both countries regarding health beliefs about osteoporosis. **Recommendations**: An educational program for the nurses to raise their awareness regarding causes, prevention & early detection and proper treatment of osteoporosis. Additionally, the nursing college curriculum committee should be focus on osteoporosis management.

Keywords: Egypt, health beliefs, nurses, osteoporosis, prevention measures, Sudan

1. Introduction

Osteoporosis is one of the most common bone metabolic disorders which have been associated with significant disability and mortality. Osteoporosis characterized by reduced bone mass/density and micro-architectural deterioration of bone tissue. [1]

Osteoporosis is a silent disease until it is a consequence by fractures which occur following minimal trauma or with no trauma. Additionally, Fractures are common and place some enormous medical personnel [2] Moreover, it may lead to serious disability, even death, and cause economic disadvantages. On the other hand, Females are eight times more at risk for osteoporosis than males. Bone mass in females is significantly less than that of the males of the same age and race. In both sexes, the peak bone mass is achieved by the age of 30 years and then, the bone mass gradually decreases with the age increase. [3]

[4] has estimated that two million fractures result from osteoporosis in 2005 and $19 billion in costs. By 2025, there will be three million osteoporotic fractures. Osteoporosis cause significantly negative impact on demand for health services and on people's physical, psychological health and quality of life. [5]

Although genetic factors e.g., age, race, family history, and gender are major determinants of peak bone mass and subsequent bone status, Osteoporosis is one of diseases which are influenced by nutrition and lifestyle, it is preventable by means of adequate nutrition and sufficient physical activity. [6] Because lifestyle practices formed early in life and may be carried into adulthood, there is an immediate need to increase osteoporosis awareness and subsequent beliefs, not only in older women, but also in younger women. [7]

Osteoporosis includes several controllable and uncontrollable risk factors, the controllable risk factors (environmental) include low activity level, sedentary lifestyle over many years, smoking, alcohol abuse and inadequate diet including eating disorder, low calcium intake, low vitamin D intake. Excessive consumption of soft drinks and caffeinated drinks cause calcium loss via the kidney. Caffeine use of more than three cups of coffee every day might increase calcium excretion in the urine and it affects bone health. The uncontrollable factors include gender, family history, ethnicity and race, advancing age, postmenopausal status and body frame size. [8]

Currently, Osteoporosis among the top five conditions causing disability and prolonged hospital stay for older people and from an economic perspective, the most cost approach is to focus on primary prevention via education, and nurses often have the responsibility of providing such educational programme. [9] During adolescence, a human's bone structure becomes strong and an adequate bone mass is increased. During childbearing period, women have maintained a certain amount of bone mass due to production of Estrogen hormone which protect against bone loss. However, after menopause, the ovaries discontinue to product estrogen. Women's estrogen levels decrease dramatically at menopause. Therefore, the osteoporosis risk factors for women are irregular menstruation period, amenorrhea, early menopause, and reduced estrogen after menopause. [10]

Achieving a higher peak bone mass through exercise and proper nutrition during adolescence is important for the prevention of osteoporosis. Exercise and nutrition throughout the rest of the life delays bone degeneration. Jogging, walking, or stair climbing at 70-90% of maximum effort three times per week, along with 1,500 mg of calcium per day, increased bone density of the lumbar (lower) spine by 5% over nine months. Individuals already diagnosed with osteopenia or osteoporosis should discuss their exercise program with their physician to avoid fractures. [11]

Based on recent research, considerable number of adult males and females are unaware about osteoporosis. There is deficiency in knowledge and poor application of the preventive actions; therefore, health education is needed to improve awareness and motivating healthy behaviours. [12] Early assessment and prevention programs should start at an early age to avoid the behavioral risk factors. Effective community–based educational programs proved to have profound effect on improvement of knowledge and health behavior related to osteoporosis and its care. [13]

Consequently, using health believe as method for osteoporosis prevention through two measures, one is based on increasing the knowledge about osteoporosis and the other is related to preventive behavior and self-efficacy measures that reinforce attitude and behavioral change. [14]

1.1. Significance of the Study

Osteoporosis is a significant global public health issue, expected to affect more people worldwide than ever by 2050. Public awareness of osteoporosis remains low, especially in less developed countries. In Egypt and Sudan there is scarcity of local studies which discuss the level of awareness toward osteoporosis. Nurses have effective, powerful and significant position to help the females from conception to older life to change their attitude regarding osteoporosis prevention and avoid fracture risk. [15] Through pertinent of literature review the researcher find that, there is limited research concerning osteoporosis knowledge, and belief concerning nurses regarding current osteoporosis preventative behaviors. This may stem from the majority of research conducted in these areas on post-menopausal women.

Aim of the Study: This study aimed to compare between nurses' health beliefs and their preventive measures regarding osteoporosis in Egypt and Sudan, through:

1. Comparing between nurses' health beliefs regarding osteoporosis in Egypt and Sudan
2. Comparing between nurses' preventive behaviors used to avoid osteoporosis in Egypt and Sudan
3. Assessing factors associated with health beliefs of nurses regarding osteoporosis.

Research questions

4. What is the different between nurses' health beliefs regarding osteoporosis in Egypt and Sudan?
5. What is the different between nurses' preventive behaviors used to avoid osteoporosis in Egypt and Sudan?
6. Is there relationship between nurses' health beliefs regarding osteoporosis and preventive measures from osteoporosis?

Operational Definitions:

√ **Preventive measures:** Actions taken for disease prevention, as opposed to disease treatment.

√ **Health Belief:** This is used to enhance the preventive health behavior through its four factors.

√ **Preventive Health Behavior:** Any action undertaken by an individual who believes herself/himself healthy for the purpose of disease preventing disease. It can be fostered by increasing individuals' knowledge as well decreasing perceived barriers.

√ **Osteoporosis:** A disorder characterized by abnormal loss of bone density and deterioration of bone tissue with an increased fracture risk.

2. Subject and Methods

- **Design**

Comparative research design was used in the current study.

- **Study Setting**

The current study was conducted in internal medicine and orthopedic units and medical and orthopedic out patients' clinic at three hospitals affiliated to the Ministry of Health named Port-Said General Hospital, Port -Fouad General Hospital, and El-Zohor central Hospital. In addition to out- patient Clinics (MCH center) at Khartoum, Bihari and Omdurman in Sudan country.

- **Sample**

A convenient sample used for this research consists of all nurses working in the previous mentioned settings, total number of 170 nurse, distributed as the following; 90 from

Egypt; in addition to 80 from Sudan were included in the study after consenting to participate in the study. Nurses were recruited in the current study from three months.

- **Tools of data collections: two tools**
were used by the researchers to collect data pertinent of this study.

Tool I: A structured questionnaire was developed after review of the literature by the researchers to collect the following: It contains two parts as follows:

First part: Demographic Data: covers the data related to general characteristics (Gender, age, and specialty)**.**

Two part: The *osteoporosis health belief scale* (OHBS) is a Likert scale that rated from strongly disagree that scored with one till, strongly agree which scored with five. It was developed by [16] and contain 42 items. The OHBS include seven subscales named susceptibility, severity, benefits to exercise, benefits to calcium intake, barriers to exercise, barriers to calcium intake, and health motivation.

Score system:

The total **score** of the osteoporosis health belief scale ranged from 42 to 210 and the possible total score of each subscale ranged from 6 to 30 points. Measures for the internal consistency of the OHBS are as follows: susceptibility, $\alpha = .82$; seriousness, $\alpha = .71$; benefits from exercise, $\alpha = .81$; benefits from calcium intake, $\alpha = .80$; barriers to exercise, $\alpha = .82$; barriers to calcium intake, $\alpha=.74$; health motivation, $\alpha=.73$.

The test retest **reliability** of the osteoporosis health belief scale was 0.90 and subscale tests test retest reliability 0.52 to 0.48. [16]

Tool II: The *second tool* is a modified *osteoporosis preventing behaviors questionnaire* that developed by [17] It consists of seven items which include 4 Questions related to calcium intake. First three questions are rated from one to ten as the following; 1 = none per week, 2 = one per week, 3 = two per week, 4 = three per week, 5 = four per week, 6 = five per week, 7 = six per week, 8 = one per day, 9 = two per day, 10 = three per day. While, Question 4 is rated as 1 = no and 2 = yes to answer the question of intake of a calcium supplement. Questions 5 and 6 are related to activity/exercise. These questions are rated from one to eight as the following; 1 = less than 10 minutes per week; 2 = 10 to 15 minute/ 1 to 2 times per week; 3 = 10 to 15 minutes, 3 to 4 times per week; 4 = 10 to 15 minutes/ 5 to 7 times per week; 5 = 20 to 30 minutes/ 1 to 2 times per week; 6 = 20 to 30 minutes, 3 to 4 times per week; 7 = 20 to 30 minutes/ 5 to 7 minutes per week; 8 = more than 30 minutes per day. Questions 7 cover food rich with calcium.

The **reliability** of the 7dPAR was tested using Pearson correlation coefficient that was 0.67. [18]

The 7dPAR holds a test-retest reliability of .90. [19] Concurrent validity was established through assessment of calcium and exercise behaviors along with the Health Belief Model (HBM) instrument. [20]

2.1. Content Validity of the Tools

Tools were reviewed by three jury experts and specialized university professors in community health nursing and medical surgical nursing field tested the content validity; According to their comments, modifications were considered.

2.2. Pilot Study

A pilot study was done on 10 % (9 from Egypt and 8 from Sudan nurses, N= 17) subjects to test clarity, applicability, understanding of language, and time needed for completing the tool. Few items were modified according to participants' responses in explanation of the study aim and process was obtained from the nurses before data collection. The nurses informed about their right to withdraw from the study without rationalization and assuring them about the confidentiality Director of the Hospitals. Oral informed consent after brief of their data throughout the study. the pilot studies. The subjects included in the pilot study were excluded from the total study sample.

2.3. Field Work

Once permission was granted to proceed with the current study from responsible and authoritative parties at general hospital and out- patient clinics in Sudan, the researchers-initiated data collection and contacted each potential nurse to explain the purpose and nature of the study. The researchers emphasized that participation in the study is entirely voluntary, the anonymity and the confidentiality of their responses were assured. Nurse participants were asked to sign a consent form. The tools of data collection were distributed to nurses after explain the purpose; the total time allowed to fulfill it by each nurse was 45 to 60 minutes. Data was collected from to 10thAugust 2017 to November10th June 2017.

2.4. Administration and Ethical Consideration

An approval to conduct the study was obtained from the dean of the Faculty of Nursing, as well as the Director of the Hospitals. Oral informed consent after brief explanation of the study aim and process was obtained from the nurses before data collection. The nurses informed about their right to withdraw from the study without rationalization and assuring them about the confidentiality of their data throughout the study.

2.5. Statistical Design

Data analysis Data were analyzed using the statistical package for social science version 20. Univariate analysis was used to describe the sample characteristics.

3. Results

Table 1. The current study conducted on sample of 170 nurse; 90 from Egypt and 80 from Sudan. About 86.5% of study sample were female; 42.4% from Egypt and 44.1% from Sudan. Additionally, more than one third of nurses their age ranged from 25 to 27 years. On the other hand, 47.7% in Egypt and 38.7% in Sudan of studied sample specialized in medical surgical nursing.

Table 2. The current study results also revealed significant differences between Egypt and Sudan regarding subscale of health beliefs regarding osteoporosis as susceptibility, seriousness, barrier of calcium intake and health motivation with P-value of 0.027, 0.013, 0.059 and 0.024 respectively. *According the research question No.one.*

Table 3. However, the current study founded no significant differences between nurses in Egypt and Sudan regarding intake of food rich with calcium as cheese, milk and/or yogurt with p-value of (0.700, 0.195 and 0.214) respectively. *According the research question No. two.*

Table 4. Moreover, the current study results did not find significant differences between Egypt and Sudan regarding nurses participating in bearing weight and/or nonbearing weight exercise with P-Value of 0.229 and 0.216 respectively (see Table 4). *According the research question No. Three.* Otherwise, the current study revealed that most of nurses in Egypt and Sudan did not intake calcium supplement (95.65 and 87.5%) respectively (see Figure 1).

Table 1. Sociodemographic characteristics of study sample (n=170 nurse)

Sociodemographic characteristics	Egypt N=90		Sudan N= 80	
	No	%	No	%
Gender				
Male	18	10.6	5	2.9
Female	72	42.4	75	44.1
Age				
19-	-	-	8	4.7
22 –	7	4.21	12	7.1
25-	36	21.2	26	15.3
28 –	27	15.9	25	14.7
>30	29	11.8	9	5.3
Specialty				
Medical surgical nursing	43	47.7	31	38.7
MCH	21	23.4	27	33.8
Orthopedic nurse	26	28.9	22	27.5
Total	**90**	**100**	**80**	**100**

Table 2. Compare Nurses Health Beliefs subscales between Egypt and Sudan

Health belief subscale	Egypt (mean+SD) N= 90	Sudan (mean+SD) N=80	t-test[*]
Susceptibility	11.9±4.1	13.5±5.4	0.027[**]
Seriousness	14.5±4.7	12.8±4.3	0.013[**]
Benefits of exercise	20.7±6.2	19.6±6.7	0.247
Benefits of calcium intake	15.5±5.2	15.4±5	0.900
Barrier of exercise	15.3±4.9	16.4±5.2	0.178
Barrier calcium intake	20.7±6.7	18.8±6.9	0.059[**]
Health motivation	21±5.9	18.9±5.6	0.024[**]

[*]t-test of independent sample, [**] significant level considers when P-Value ≤ 0.05.

Table 3. Compare between Nurses health behaviors to prevent osteoporosis in Egypt and Sudan part 1

Health behaviors	Eating cheese				Drinking milk glass				Eating yogurt			
Country	Egypt		Sudan		Egypt		Sudan		Egypt		Sudan	
	No	%	No	%	No	%	No	%	No	%	No	%
Non/week	7	4.1	13	7.6	14	8.2	17	10	11	6.5	8	4.7
1/week	12	7.9	11	6.5	5	2.9	6	3.5	14	8.2	17	10
2/week	16	9.4	11	6.5	7	4.1	8	4.7	16	9.4	9	5.3
3/week	11	6.5	11	6.5	6	3.5	10	5.9	17	10	5	2.9
4/week	9	5.3	-	-	5	2.9	5	2.9	6	3.5	9	5.3
5/week	6	3.5	3	1.8	10	5.9	2	1.2	7	4.1	4	2.4
6/week	8	4.7	10	5.9	15	8.8	7	4.1	3	1.8	10	5.9
1/day	7	4.1	6	3.5	13	7.6	10	5.9	9	5.3	10	5.9
2/day	5	2.9	9	5.3	8	4.7	9	5.3	3	1.8	3	1.8
3/day	4	2.4	4	2.4	6	3.5	5	2.9	2	1.2	2	1.2
others	5	2.9	2	1.2	1	0.6	1	0.6	2	1.2	3	1.8
P- Value	**0.700**				**0.195**				**0.214**			

Table 4. Comparison between Nurses health behaviors to prevent osteoporosis in Egypt and Sudan part 2

Health behaviors	Participate in weight bearing exercise				Participate in non-weight bearing exercises			
Country	Egypt		Sudan		Egypt		Sudan	
	No	%	No	%	No	%	No	%
Less than 10 min/w	28	16.5	32	18.8	47	27.6	31	18.2
10- 15min/1-2times/w	30	17.6	20	11.8	11	6.5	11	6.5
10-15min/3-4times/w	5	2.9	5	2.9	10	5.9	5	2.9
10-15min/5-7times/w	3	1.8	1	0.6	4	2.4	8	4.7
20-30 min/1-2times/w	7	4.1	1	0.6	5	2.9	12	7.1
20-30 min/3-4times/w	2	1.2	6	3.5	8	4.7	5	2.9
20-30 min/5-7times/w	7	4.1	8	4.7	4	2.4	5	2.9
More than 30 min/ w	8	4.8	7	4.1	1	0.6	3	1.8
P-Value	0.229				0.216			

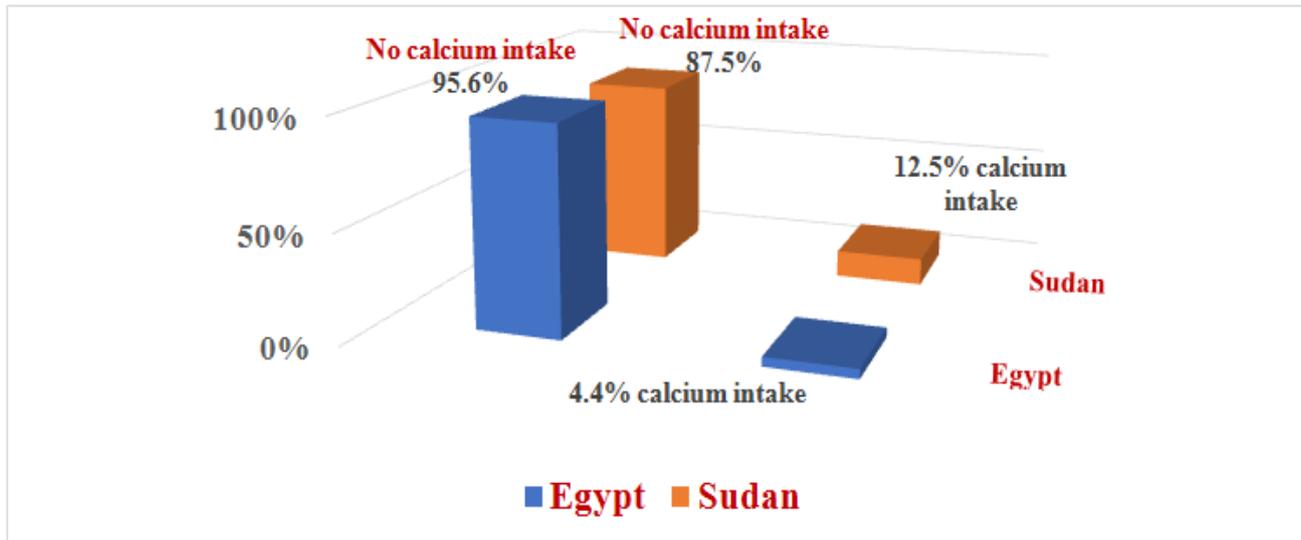Significant level considered when P-Value ≤ 0.05.

Figure 1. Comparison between Egypt and Sudan nurses regarding calcium supplemental intake

4. Discussion

Osteoporosis is widely spread in both men and women; however, it is more prevalent in women than men. Moreover, Osteoporosis has been recognized as a major public health problem by nurses' providers in Egypt and Sudan. Sufficient information about women's knowledge, health beliefs, and some of the life habits are important to plan for the disease prevention Additionally, life style e.g. diet, exercise, health beliefs and behaviors or preventive measures that should be considered to decrease occurrence of osteoporosis and its consequences. Therefore, the current study aims to compare between nurse's health beliefs and preventive behaviors regarding osteoporosis in Egypt and Sudan.

The current study results revealed significant differences between Egypt and Sudan regarding subscale of health beliefs regarding osteoporosis as susceptibility, seriousness, barrier of calcium intake and health motivation. This result could reflect different cultures of both countries. This result was concordant with similar study carried by [21] in Jordanian who reported that there was a significant increase in health beliefs of perceived susceptibility, perceived severity to osteoporosis, perceived benefits of exercise and perceived calcium intake to prevent osteoporosis, and to significantly reduce the perceived barriers to exercise and calcium, in order to portend an increase in self-reported health motivation.

However, there is no significant difference between both countries in other subscale of health beliefs regarding osteoporosis as exercise, calcium intake and barrier of calcium intake and this could interpret that most of nurses in Egypt and Sudan did not intake calcium supplement and/or food rich with calcium without significant difference between Egypt and Sudan. This result could be referring to the reduction of nurse's knowledge especially osteoporosis prevention. Supporting this interpretation, a study assesses nurse's knowledge, practice and attitude of General Medical Practitioners and Nursing professionals regarding osteoporosis which revealed that general medical practitioners and nursing professionals have inadequate knowledge regarding osteoporosis especially in the preventive and treatment aspects. [22]

As regard to risk factors, the present study founded non-significant differences between nurses in Egypt and Sudan regarding intake of food rich with calcium as cheese, milk and/or yogurt. This is incongruent with a study by [23] who studied "Osteoporosis knowledge among female adolescents in Egypt". They reported that when identifying good sources of calcium, the studied sample answered buffalo milk (99.1%) as dairy products and this also agreed with the result of a study by Cook, 2016 who studied "Osteoporosis: public awareness, commitment, and perspective". They mentioned that people can get calcium from milk products and calcium rich diet.

However, the study of Zhang &Chandran, 2011 [24] found that the majority of nurses knew that without preventive measures, 20 percent of women older than 50 years would have a fracture due to osteoporosis in their lifetime. While, more than one third of nurses believing that a glass of milk provided enough calcium to prevent osteoporosis in children is not appropriate here our sample is adult).

Moreover, the current study revealed that the highest percent of nurses participate in bearing weight exercise for less than ten minutes weekly in both countries without significant difference and did not reach to one third of the study sample. However, lack of exercise is an important risk factor that leads to developing osteoporosis. Since bone loss always associated with prolonged immobility and/or inactivity because exercise stimulates skeletal growth as reported by. [25]

Furthermore, a large number of cross-sectional studies of both genders and at all stages of life have shown that bone density depends on activity levels, although the studies do not indicate whether physical attributes determine activity levels (i.e., well-muscled persons perform weight-lifting) or vice versa (weight lifting causes persons to be well muscled). [26]

Furthermore, the present study results showed that most of nurses in Egypt and Sudan did not intake calcium supplement. Despite [27] in Saudi Arabia who conducted similar study to evaluate effectiveness of education using the HBM (health believe model) in preventing osteoporosis found that the majority of the nurses were

low perceived calcium intake barriers, however there was non-significant decrease in the barriers due to unhealthy nutritional habits.

5. Conclusion

The current study and research question concluded that there were no significant differences between Egypt and Sudan regarding preventive measures applied by nurses to prevent osteoporosis in spite of the significant differences between both countries regarding health beliefs about osteoporosis. Regular educational program regarding osteoporosis in both countries are needed to refresh nurse's knowledge and preventive measures that should be utilized by them.

6. Recommendation

Based on the findings of the present research, the following recommendations are suggested:

1. Educational programs for the nurses to raise their awareness regarding causes, prevention & early detection and proper treatment of osteoporosis.
2. The nursing college curriculum committee must focus on osteoporosis management in their curricula.

Future research regarding application of osteoporosis management guidelines and its effect on nurse's health outcome are needed.

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