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The effect of instructional guidelines intervention on pregnant women's knowledge, clinical outcomes, and self-efficacy regarding prevention of osteoporosis

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***Abstract*---**The prevalence of osteoprosis is higher in females than in males. Hence, if efforts to avoid it are unsuccessful, more than 10 million women will be affected by it by the year 2020. One in three women and one in five men over the age of fifty will break a bone as a result of osteoporosis worldwide. Aim: The study was aimed to evaluate the effect of instructional guidelines intervention on pregnant women's knowledge, clinical outcomes, and self-efficacy regarding the prevention of osteoprosis. The research design quasi-experimental design was used to achieve the aim of the current study. Setting: It was applied in ante-natal and rheumatoid clinics at Sohag University Hospital, Egypt. Sample: A convenient sample included 200 women randomly assigned into two equal groups, with 100 women in each group (the study and control groups). Tools of data collection: Three data collection tools were used: I) a structured interview questionnaire, II) a women's knowledge assessment sheet regarding Osteoporosis, and III) Factor loadings for the osteoporosis self-efficacy scale. The results: Showed that; regarding their knowledge, there was a significant difference between the two groups and self-efficacy post-instructional guidelines intervention which causes better clinical

outcomes among the study group compared to the control group with P<0.001. Conclusion: instructional guidelines implementation had a significant positive effect on improving women's knowledge, clinical outcomes, and self-efficacy regarding the prevention of osteoprosis. Recommendations: instructional guidelines intervention regarding the prevention of osteoprosis should be recommended for women during the antenatal period to improve their knowledge, better clinical outcomes, and self-efficacy.

***Keywords*---**Instructional guidelines, Knowledge, Prevention of osteoporosis, Self-efficacy.

Introduction

The condition known as osteoporosis, often known as silent illness (porous bone), makes bones more brittle. Low bone mass density and deterioration of the microarchitecture, particularly of the hip, spine, wrist, and shoulder, are the most common pathological causes of skeletal weakening and are associated with a concomitant decrease in bone mass and bone microstructure loss. These factors can increase the risk of fracture and lower people's quality of life in physical, social, psychological, and economic aspects, as well as increase their risk for other health problems (Kanis, 2019&Shuler, et al. 2018)

Our bones grow and develop from infancy into adulthood, reaching what is known as peak bone mass in our early 20s, when the bones are at their strongest, densest, and least likely to fracture. To maintain the strength of our skeleton, bone is continually replaced throughout life. New bone replaces old bone. Yet, more bone is lost and not replaced in those who have osteoporosis. As a result, the bones gradually age and become more susceptible to breaking. Although osteoprosis remains underdiagnosed and undertreated, the osteoprosis fracture risk can be decreased by timely identification of bone mineral loss using densitometry and the adoption of specialized antiresorptive therapy or anabolic treatment (Briançon, et al.2017 & Delmas, et al.2017).

Every three seconds, an osteoporotic fracture due to porous bone, which affects more than seventy-five million people worldwide, results in more than 8.9 million fractures (National Osteoporosis Foundation, 2018). Females are more likely than males to have osteoprosis. If efforts to prevent it are unsuccessful, that will impact more than 10 million women by 2020. Around the age of fifty, osteoporosis will cause a broken bone in one in three women and one in five men worldwide. (International Osteoprosis Foundation, 2020).

By being informed about osteoporosis and the risk factors that could affect patients, patients can make sure that receiving a diagnosis and start treatment as soon as possible. According to the World Health Organization (WHO, 2019), age, sex, long-term glucocorticoid use, secondary osteoporosis, genetics, prior fragility fracture, low body mass index (BMI), smoking, excessive alcohol consumption, sedentary lifestyle, having a diet lacking in calcium and Vitamin D, being

nulliparous, late menarche, and early menopause are risk factors for osteoporosis (Jeihooni, et al., 2015) &(Khoshnood, et al., 2019).

Accordingly, the results of various research indicate that bone mineral density (BMD) can be improved and the pace of bone density loss can be reduced by exercising and getting enough calcium and vitamin D in your diet. Exercise, calcium supplementation, and knowledge of osteoporosis risk factors have all proven very successful in preventing the disease. For the diagnosis of osteoporosis and the evaluation of fracture risk, bone mineral density is recognized as the gold standard (Kelley & Kelley, 2019)

Identification of the variables influencing behavior changes can facilitate transformation for such a purpose. As a result, it is important to look into the factors that influence women's adoption of habits that prevent osteoprosis. Falsely thinking that osteoprosis is not dangerous is a common cause of noncompliance with osteoprosis prophylaxis (Samia, et al., 2018).

Another study conducted at the Trauma Unit of Assiut University Hospital, Egypt, found that the prevalence of osteoporosis was high (74.9%) in patients admitted with hip fractures. In rural areas of Upper Egypt, the prevalence of osteoporosis in postmenopausal women was even higher, reaching up to 47.8%. Having current guidelines for the therapy of osteoporosis in Egypt is crucial given the high prevalence of the condition and its impact on public health. Recently, the treat-to-target approach has been proposed as an effective osteoporosis care method (Winzenberg, 2019).

Even though there has been an increase in awareness of osteoporosis over the past 20 years due to the development of several potent pharmaceutical treatments for those at high risk, it was still rated as moderate among Egyptian women, particularly in terms of risk factors, preventive measures, and consequences (Elliott et al., 2017).

Significance of the study

Women need to be aware of the risk of osteoporosis because it is silent, preventable, and adjustable. They should also engage in early counseling techniques from youth to premenopause before an irreversible phase of diminishing bone mass. According to Pourhashem, et al., (2018) study, osteoprosis was present at a prevalence rate of 32, 1% overall in at least one measurement site (28, 5% in the lumbar area and 14,5% in the femoral region).

The results of several research indicate that bone mineral density can be improved and bone density loss can be significantly slowed down by engaging in physical activity and consuming proper amounts of calcium and vitamin D. (BMD) Preventing osteoprosis has been made much easier because knowledge of the risk factors for the condition, exercise, and calcium supplements (Hernlund, et al. 2017) & (Nobakht, et al.2019).

In the Egyptian population, osteoporosis is relatively common and is linked to a variety of risk factors and medical disorders. According to various research

conducted in Egypt, the prevalence of osteoporosis was estimated to be 28.4% in women and 21.9% in men, whereas osteopenia affected 53.9% of women and 26% of men (Kutsal et al .2020).

Women are an important target population in preventative intervention for osteoporotic fractures due to factors like their lighter, thinner bones and longer life spans. They lose bone more quickly and at a younger age than men (by roughly 10 years). Also, compared to men, women have a two-fold increased risk of osteopenia and a four-fold increased risk of developing osteoporosis. By the age of 50, especially during the first five years following menopause, women are at a 50% higher risk of developing an osteoporosis-related fracture than males (20%) (Tuzun, et al., 2016 & El Miedany, et al. 2020).

Operational definitions

Clinical outcomes
Refers to laboratory tests that evaluate CBC-based measurements of calcium, vitamin D, and bone mineral density (BMD).

Aim of the study
The study aimed to evaluate the effect of instructional guidelines intervention on pregnant women's knowledge, clinical outcomes, and self-efficacy regarding the prevention of osteoprosis.

Research hypothesis

H1: Pregnant women who receive instructional guidelines are expected to have a higher level of knowledge regarding the prevention of osteoprosis than those who don’t receive them.

H2: Pregnant women who receive instructional guidelines are expected to have a higher level of self-efficacy regarding the prevention of osteoprosis than those who don't receive

H3: Pregnant women who receive instructional guidelines are expected to have better clinical outcomes (BMD, vitamin D& Ca ionized) levels than those who don’t receive

Materials and Methods

Research design
A quasi-experimental research design (pre/post-test) control and study group were used to achieve the aim of the current study.

Setting
It was applied in Antenatal and Rheumatoid Clinics at Sohag University Hospital, Egypt.

Subjects

A convenient sample included 200 pregnant women randomly assigned into two equal groups, with 100 women in each group (the study and control groups) with the mentioned inclusion criteria; (Women aged 20 to 55 years old, free from physical and cognitive disability, lack of fractures, lack of digestive disorders, food allergies, and have the consent to participate in the study). Women with rickets, rheumatoid arthritis, hereditary early osteoporosis, and osteomalacia were also excluded from the research.

Tools of data collection

Data were collected using the following three tools;
Tool (I):- Structured interview questionnaire: It compromised of three parts:
Part 1: The women's demographic information, such as their names, ages, educational backgrounds, exposure to sunshine, etc (12 Items).
Part two: Information about women's health, including information on osteoprosis in the family history, history of hormonal therapy, fractures, engaging in physical activity, history of osteoprosis diagnosis, etc. (18 Articles.(
Part three: A laboratory investigation that included calcium (Ca ionized), vitamin D, and BMD (3 Items).

Tool (II):- Women's knowledge assessment sheet regarding Osteoporosis:- It was culturally adjusted and translated from the original knowledge (**Kim et al., 1991) (Hsieh, et al. 2014**). It was designed to gauge women's knowledge about osteoporosis and covered the basics. Questions were included, and respondents were asked whether they were more or less likely to have an impact on their likelihood of developing the disease, for example, "Osteoporosis increases the risk of bone fractures," or "Type of physical activity is beneficial for osteoporosis," etc. **(19 Items).**
-Each item was scored either (0) for an incorrect answer or (1) for the correct answer. The sum of correct responses to all questions produces the total score range from **(0: 19)**.
Scoring system: If the overall Knowledge score was 60% or higher, it was deemed satisfactory; if it was less than 60%, it was deemed unsatisfactory. This information can be helpful in any follow-up studies to gauge the success of preventable education initiatives.

Tool (III):- Factor loadings for the Osteoporosis Self Efficacy Scale which was originally developed by **(Kim et al., 1991)** and has been translated into Arabic, adapted, and validated by the researcher. It was used to gauge people's level of confidence in changing their exercise-related behavior. (9 things), calcium consumption (six items), and vitamin D (five items). When asked, "How confident or certain would you be that you could perform any of the following," the question is directed at women. followed by a variety of suggestions, like "Perform workouts even if they are difficult" "Obtain foods that supply an adequate amount of calcium even when they are not readily available," "Eat vitamin D-rich meals regularly," etc. then, females answer with a yes or no (20 Items).
Scoring system: Each response received a score of either (0) for no or (1) for yes. The final score ranges from when all of the replies to all of the items are added

together (0: 20). If the overall score was 75% or more, it was called high; if it was 50% to 75% or less, it was labeled moderate; and if it was less than 50%, it was regarded low.

Validity and Reliability

A jury of 5 professionals with expertise in medical-surgical nursing and obstetric and newborn health nursing evaluated the content validity. The final version was established after the experts revised the tools for clarity, application, comprehensiveness, simplicity, and clarity. The back-translation method was applied to confirm the accuracy of tool I translation. Using Chronbach's Alpha test to gauge the tools' internal consistency, the testing reliability of the suggested tools was estimated. In terms of reliability, it was discovered that tools I, II, and IV all passed Chronbach's Alpha test with scores of 0.91, 0.86, and 0.89 respectively.

Pilot Study

Before data collection, 10% of the women participated in a pilot study to assess the tools' applicability and viability and make any necessary adjustments before performing the main study. Women who participated in the pilot study were not included in the study population.

Ethical Considerations

The Sohag University Hospital administrative authority granted official clearance after being informed in detail about the study's purpose. The women were given a thorough explanation of the study's objectives before the data-gathering process began. Women were given the assurance that participation in the study was completely optional and that they could leave at any time without facing any repercussions. They received guarantees that their anonymity and the confidentiality of their data were safeguarded.

Field of work

The following phases were used to implement the data-gathering process in the current study:

Assessment and planning phase:

- The researchers reviewed the related literature and prepared the used instruments to collect data; Instruments were selected for the reliability assessment after reviewing the relevant literature**.**

Implementation phase:

1- Data were collected during the period from the first of March 2021 to the end of October 2021. The researcher divided the subject into two groups (study and control group). All women who visit the antenatal and rheumatoid outpatient clinic of Sohag University Hospital who met the inclusion criteria were enrolled in this study. comprehensive women’s

knowledge assessments were performed by the researcher who visited the previously mentioned settings two times a week, using different sessions.

2- During the first session, the researchers explained the nature and purpose of the study and took oral consent from women who fulfilled the study criteria. The researcher interviewed both study and control groups using tools of data collection (I, II, and III) to obtain baseline data (pretest), then divided each group into four equal groups (16 women for each).
3- During the same session, the researchers explained the instructional guidelines regarding the prevention of osteoprosis for the study group including four educational sessions of 50 to 60 minutes of speech, group discussion, questions, and answers, as well as posters and educational pamphlets and PowerPoints displayed by researchers. The educational topics covered during the training sessions included an overview of osteoporosis, its symptoms, complications, and diagnosis; the importance of nutrition and exercise in preventing osteoporosis; and the role of family members in developing, facilitating, and providing a suitable eating and walking regimen. The study group finished the questionnaires (I, II, and III) (posttest) immediately after the instructional guidelines intervention.
4- Every woman in the study group was provided the booklet that was developed by the researchers with detailed information on knowledge and practice about osteoporosis.
5- The control group did not get any training; nevertheless, after the study, this group attended a training session on osteoporosis due to ethical reasons.

Evaluation phase

The evaluation was implemented after the end of instructional guidelines intervention for all women in the study and control group by using the same pretest tools to determine how much knowledge and practice have improved.

Instructional guidelines booklet content

In addition to providing information on managing osteoporosis, the booklet served as a teaching tool for researchers in light of the relevant literature. The content of the instructional guidelines included general information about osteoporosis (including the definition of osteoporosis, prevalence, and controllable risk factors; symptoms, complications, diagnosis, and treatment of osteoporosis); (c) preventive measures (including improving calcium intake through low-fat food selections); and (d) starting exercise activities. The educational materials were delivered through video for two hours (lecturing, question-and-answer, pamphlets, flow charts, booklet, video, slides, and discussion method). Researchers used four sessions of a small group planning to develop the instructional guidelines in person.

Statistical design

Using the statistical software for social sciences (SPSS 22.0) for descriptive statistics, which are presented as frequencies and percentages for categorical variables, the acquired data were examined. For continuously varying variables,

means and standard deviations were used. To calculate the correlation between numerical variables, the Pearson correlation coefficient (r) was used. The variances between mean scores before and during program implementation were assessed using student t-tests. Differences between categorical variables were evaluated using chi-square tests. P 0.05 was used to determine statistical significance.

Results

Table 1 illustrates that The mean age was (35.87 ± 2.53) for the study group and (36.68 ± 3.46) for the control group, 67% and 68% of them were not working in the study group and control groups respectively. As regard residence, 70% and 69% were living in rural areas in both the study and control groups respectively, and the majority of them (92% and 90%) were exposed to sun rays. There was a non-statistically significant difference in terms of the demographic characteristics of the study and control groups that indicated before the intervention (P>0.05) that the two groups were similar.

Table 2 shows the current and past history of the studied women. About half of the study and control groups had a history of osteoporosis (45%, and 51%) respectively. The majority of both groups had no hormonal therapy (75%, 80%) respectively, also, 81% and 78% of the studied women in both the study and control group don't perform physical activity. There was no statistically significant difference regarding all items of the current and past health history before the intervention (P>0.05) between the study and control group which reflected that the two groups were similar.

Table 3 shows that there was an improvement in the mean scores of knowledge in the study group from (8.52 ± 1.89) to (14.63 ± 2.27) with statistically significant differences at (p=0.000), while there was a slight increase in the mean score of knowledge in the control group from (8.67 ±2.04) to (9.29 ±2.74). Also, the same table showed that there was a significant difference in mean scores of study and control groups post-instructional guidelines intervention (p=0.000).

Table 4 shows that there was increasing in the mean scores of self-efficacy in the study group from (7.98 ± 1.65) to (14.53 ± 2.67) with statistically significant differences at (p=0.000), while there was a slight increase in the mean score of knowledge in the control group from (8.33 ± 2.75) to (8.63 ± 1.99). Also, the same table showed that there was a significant difference in mean scores of study and control groups post-instructional guidelines intervention (p=0.032).

Table 5 portrays the correlations between clinical outcomes and studied women's knowledge and self-efficacy. It was observed that there were significant correlations between calcium and Vit. D levels and studied women's knowledge while there were no significant correlations with other variables.

Figure 1 illustrates that there were no differences among the control group regarding calcium, vitamin D and BMD pre and post-instructional guidelines intervention. On the other hand, there were statistically significant differences

among the study group for calcium (P=0.001) and vitamin D (P=0.001) while BMD was not statistically significant.

Table (1): Percentage distribution of the studied women regarding demographic characteristics (200)

Items	Study Group (n=100) (%)	Control Group (n=100) (%)	X^2	P-Value
Age:				
– Less Than 20	20%	17%		
– 20- <40	22%	24%		
– 40-50	33%	35%	0.589	0.959
– More Than 50	25%	24%		
Mean ± SD	35.87 ± 2.53	36.68 ± 3.46		
Education:				
– Not Educated	10%	11%		
– Basic	23%	24%	0.448	0.974
– Intermediate	25%	26%		
– High	42%	39%		
Occupation:				
– Governmental	18%	20%	0.572	0.751
– Craft	15%	12%		
– Not Working	67%	68%		
Residence:				
– Urban	30%	31%	0.139	0.835
– Rural	70%	69%		
Pregnancy No:				
– No	21%	19%		
– 1-3	49%	50%	0.031	0.985
– 3-5	20%	22%		
– more than 5	10%	9%		
Exposure To Sunrays:				
– Yes	92%	90%	0.151	0.697
– No	8%	10%		

Table (2): Percentage distribution of the studied women regarding their current and past health history (200)

Items	Study Group (n=100) (%)	Control Group (n=100) (%)	X^2	P-Value
History of Osteoporosis:				
– Yes	45%	51%	0.281	0.96
– No	55%	49%		
History of hormonal therapy:				
– Yes	25%	20%	0.039	0.843

– No	75%	80%		
Previous Fracture: – Yes – No	 22% 78%	 21% 79%	0.174	0.676
Performing any physical activity: – Yes – No	 19% 81%	 22% 78%	0.037	0.848
Medication/Supplements: – Yes – No	 25% 75%	 27% 73%	0.043	0.837
Previous Diagnosis: – Yes – No	 6% 74%	 23% 77%	0.015	0.945
Diagnostics Tests: – Yes – No	 11% 89%	 13% 87%	0.035	0.965
Osteoporosis Treatment: – Yes – No	 6% 94%	 5% 95%	0.208	0.648

Table (3): Comparison of the mean scores of knowledge among the studied women pre and post-the instructional guidelines intervention regarding osteoporosis

Women knowledge	Pre instructional guidelines	Post instructional guidelines	T-Value	P-Value
	Mean ± SD	Mean ± SD		
Study Group	8.52 ± 1.89	14.63 ± 2.27	-17.03	0.000
Control Group	8.67 ±2.04	9.29 ±2.74	1.339	0.188
P-Value	0.134	0.000		

Table (4): Comparison of the mean scores of self-efficacy among the studied women pre and post-the instructional guidelines intervention regarding osteoporosis

Self-Efficacy	Pre instructional guidelines	Post instructional guidelines	T-Value	P-Value
	Mean ± SD	Mean ± SD		
Study Group	7.98 ± 1.65	14.53 ± 2.67	-52.037	0.000
Control Group	8.33 ± 2.75	8.63 ± 1.99	0.274	0.798
P-Value	0.065	0.032		

Table (5): Correlation coefficients between clinical outcomes and the studied women's knowledge and self-efficacy

	Knowledge	Self-Efficacy
	r (P-Value)	*r* (P-Value)
Calcium Level	0.31(0.004*)	0.05(0.557)
Vit. D Level	0.23(0.006*)	0.04(0.962)
BMD	0.025(0.456)	0.13(0.534)

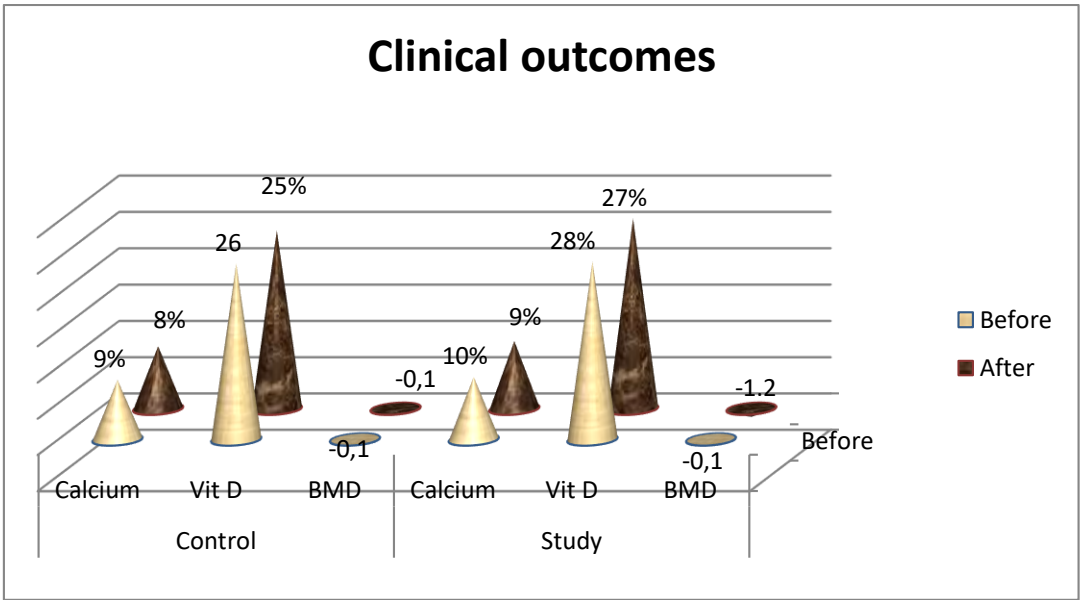

Figure (1): Percentage distribution of the mean scores of the studied women's clinical outcome pre and post-the instructional guidelines intervention

Discussion

Every year, osteoporosis results in almost 9 million fractures, resulting in significant expenses to the health care systems as well as significant disability and mortality for women who have the condition. Osteoporosis may be more prevalent in underdeveloped nations, such as the Middle East, where the majority of Arab women reside (Shawashi1&Darawad1, 2020). There is a case to be made that women in the Arab world may be more susceptible to osteoporosis due to clear cultural and social factors, such as a higher rate of pregnancies, prolonged lactation, a lack of physical activity, possibly lower vitamin D levels due to inadequate sun exposure and dress habits, and perhaps lower vitamin D and calcium intake (John& Kibusi, 2020). Examining the relationships between knowledge, self-efficacy, and osteoporosis-related preventive health behavior (i.e., physical activity and nutritional intake) in a large sample of women with osteoporosis was crucial to filling this gap (Gul Pinar1 and Tevfik Pinar2, 2020).

According to the present study's findings, the mean ages of the study group and the control group, respectively, were 35.87 2.53 and 36.68 3.46 years old, respectively. This study's findings concur with those of Bahbadi, et al. (2020), who reported that the age groups with the highest frequency of interviews for the early detection of BC women in the Faskous area were (30-39years) with a mean age of (38,7) years old.

Also, this study's findings are corroborated by Abushaikha et al. (2016) and Sharifikia et al. (2019), who indicated that an osteoporosis primary preventive program should be started at a young age. The majority of the participants were married, and slightly less than half of them were in the age range of 35 to 45 years, in keeping with El-Hay and Mohamed, (2015) study on the impact of educational programs on developing accurate information and behavior among women regarding BC knowledge and BSE.

Regarding the study subjects' residences, it was revealed by the current research that the majority of the women in both groups lived in rural areas. This study's findings are consistent with those of Mohamed, et al. (2020), who noted that the majority of the sample's included participants were from rural areas. This study's conclusion, as explained by the researchers' experience, may be related to the fact that women in rural areas lack access to health and educational services. Additionally, cultures, norms, and places where women live have an impact on their behaviors and patterns of lifestyle, as well as their attitudes towards accepting the illness and changing their lifestyles in accordance with recommended therapeutic regimens. This reflected Egyptian culture.

The current investigation found that the demographic differences between the study and control groups were not statistically significant. From the perspective of the researchers, it suggested that the two groups shared many traits.

The current investigation revealed that the majority of both groups had no or little use of (hormonal therapy, history of fracture, physical activity, medication or supplements used, previous diagnosis, diagnostic tests &osteoporosis treatment). Less than half and just over half of the research and control groups, in contrast, had a history of osteoporosis and prior trauma. This might be because osteoporosis, once established, is an incurable chronic condition that cannot be reversed.

Prevention is therefore preferable to treatment. According to Ahmed & Shrief (2018), 25% of the study participants had a family history of BC, 50% of their relatives have BC, and a third of their moms have BC. The findings of the current study are similar to their findings. While El-lassy & Abd Elaziz (2019), who studied the effect of education programs concerning BSE on female employees at Damanhour University, disagreed with this study's findings, they found that the majority of the studied sample had no history of BC and that most had no prior breast problems or lumps.

Regarding the knowledge of the women in the current study, there was an improvement in the mean knowledge scores in the study group from (8.52± 1.89) to (14.63 ±2.27) with a statistically significant difference, while the mean

knowledge scores in the control group slightly increased from (8.12 ±2.03) to (10.32± 2.65). Also, after the instructional guidelines, there was a significant difference in the mean scores between the study and control groups. This outcome was consistent with the hypothesis that there would be increased knowledge and awareness of osteoporosis. The study that found that Saudi females had high levels of knowledge also noted a rise in knowledge, which was explained by the existence of an awareness-raising and preventive campaign for osteoporosis run by the Center of Excellence for Osteoporosis (Shawashi1& Darawad1, 2020)

John & Kibusi's (2020) findings that ongoing education aids in the early detection and treatment of preeclampsia for enhancing maternal and newborn survival confirmed this finding. This study finding was in agreement with Mohamed, et al. (2020), who reported that education was proven to be effective in the prevention of disease during pregnancy in the intervention group and the intervention group's education improved after the intervention. Additionally, this study finding was supported by several studies (Abushaikha, et al. (2016), Chan, et al. (2015) that has already been conducted on osteoporosis preventive interventions using this model, in most of which knowledge improved after the intervention.

This study finding, as mentioned by the researchers, may be attributable to the impact of applying instructional guidelines among study groups that acquire information and appropriate self-care practices and lifestyle modifications. According to the researchers, these findings could be related to the impact of instructional guidelines intervention on raising the bar for knowledge. This supported the usually high levels of knowledge of osteoporosis and highlights the value of teaching women about such an important subject. As a result, the study's findings showed that the instructional instructions were effective in raising awareness of osteoporosis.

According to the current study, the study group's self-efficacy mean scores increased from (7.98 1.65) to (14.53 2.67) with statistically significant differences. This study's findings are consistent with those made by Kaveh, et al. (2018), who looked at the impact of educational programs regarding osteoporosis prevention on students' self-efficacy in Shiraz and found that the intervention group's efficacy significantly increased following the training. Similar to Ali, et al. (2019), who found that the mean scores of self-efficacy in their study demonstrated that both groups had a low ability to control food and walk, before intervention the mean self-efficacy score considerably rose in the experimental group following the intervention.

This study's findings differ from those of Jessup et al., (2017) and Aree and Petlamul (2018), who found that participants had lower levels of self-efficacy concerning exercise and calcium intake. According to the researchers, this might be because extremely effective women, have high levels of self-efficacy and believe they can achieve their goals and are also likely to be healthy. To help women adopt or sustain healthy behaviors, efficacy can play a significant role.

The present study revealed a highly statistically significant positive link between women's self-efficacy scores following the implementation of instructional

instructions and their level of knowledge concerning the study group. This indicates that boosting women's knowledge is the first step towards encouraging positive behaviors to enhance self-efficacy and reflected that good knowledge is related to effective self-care. It also signifies that women with high levels of information were having increasing self-efficacy. AbdElgaffar and Atia (2018) found a statistically significant relationship between overall knowledge and self-efficacy. High knowledge score was not linked to women's osteoporosis preventative practices, according to Ziccardi, et al. (2020), notwithstanding this finding.

According to the current study, there were strong associations between the study group's women's knowledge and their calcium and vitamin D levels. This study's findings can be explained by the fact that study participants who followed directions and adhered to instructions improved their understanding of osteoporosis, which in turn led to higher levels of calcium and vitamin D in the blood and better clinical outcomes. The findings of this study disagreed with those of Khoshnood, et al. (2019), who claimed that unhealthy habits (particularly low calcium consumption) did not differ significantly between groups following osteoporosis education.

According to the study's findings, there were calcium and vitamin D disparities that were statistically significant between the study groups. The results showed that instructional instructions were successful in modifying women's behavior to lower their risk of osteoporosis, according the researchers. So that the research's hypotheses could be confirmed, this outcome was anticipated. Eventually, the study's findings validated the research hypothesis, confirming that the instructional guidelines intervention had a statistically significant favorable impact on women's awareness of and behavior related to osteoporosis.

Conclusion

Based on the findings of the current study, it can be concluded that the instructional guidelines intervention had a significant positive effect on improving women's knowledge, clinical outcomes, and self-efficacy regarding the prevention of osteoprosis. Also, there was a highly statistically significant positive correlation between women's level of knowledge, clinical outcomes, and their self-efficacy score post-intervention.

Recommendations

Based on the findings of the present study, the following recommendations were suggested:

1- Instructional guidelines intervention regarding the prevention of osteoprosis should be recommended for women during the antenatal period to improve their knowledge, better clinical outcomes, and self-efficacy.
2- Replication of the current study with a larger sample of women regarding the prevention of osteoprosis in different settings is required for generalizing the results.
3- Future research about the harmful effects of osteoprosis on maternal and neonatal health

References

AbdElgaffar, S.I, Atia, G .E. (2018): The impact of implementing educational program regarding breast self-examination on knowledge and practices of female students of Nursing Technical Institute of Menoufia University. J Nurs Sci 1, PP:(44–50).

Abushaikha, L, Omran, S& Barrouq, L. (2016): Osteoporosis knowledge among female school students in Jordan. Eastern Mediterranean Health Journal, 15(4), PP: (906–911).

Ahmed, S.A & Shrief, S.E. (2018): The effect of health promotion program on female breast self-examination knowledge and practice. Available at: http://www.enj.eg.net. Accessed on Thursday, 17 June 2020,

Ali, K. J, Seyyed, M. K, Zahra, K, Hassan, J, Seyyed, H. K. (2019):-The effect of education based on based health belief model on osteoporosis and bone mineral density among women (Journal of Research & Health Social Development & Health Promotion Research Center 9(1), PP: (11- 20).

Aree, U .S& Petlamul, M.(2018):- Osteoporosis knowledge, health beliefs, and preventive behavior: a comparison between younger and older women living in a rural area. Health Care Women; 34(12), PP: (66-1051). Available at: [http://dx.doi.org/10.1080/07399332.2012.736565] [PMID: 23477608],.Accessed on 2 February 2019.

Bahabadi, F, Estebsari, F, Rohani, C. et al., (2020): Predictors of Health-Promoting Lifestyle in Pregnant Women Based on Pender's Health Promotion Model, Int J Women Health., 12, PP: (71-77).

Briançon, D, de Gaudemar, J.B,& Forestier, R.(2017): Management of osteoporosis in women with peripheral osteoporotic fractures after 50 years of age: a study of practices. Joint Bone Spine2004; 71(2), PP: (30-128).

Chan, M. F, Kwong, W. S, Zang, Y. L & Wan, P. Y. (2015): Evaluation of an osteoporosis prevention education program for young adults. Journal of Advanced Nursing, 57(3), PP: (270–285).

Delmas, P.D, van de Langerijt, L, Watts, N.B, et al. (2017): Underdiagnosis of vertebral fractures is a worldwide problem: the IMPACT study. J Bone Miner Res2005; 20(4), PP: (63-557).

El-Hay, S.A &Mohamed, N.S. (2015): Effect of an educational program about breast cancer knowledge and breast self-examination training on building accurate information and behavior among women. J Nat Sci Res 5, PP :(58–70).

El-lassy, R.B & Abd Elaziz A. (2019): Impact of a health education intervention program regarding breast self-examination on female employees in Damanhour University. Zagazig Nursing Journal 11, PP: (21–24).

Elliott, J.O, Seals, B.F& Jacobson, M.P.(2017): Osteoprotective knowledge in a multiethnic epilepsy population. J Neurosci Nurs; 40(1), PP: (14-24).

Gul Pinar1& Tevfik Pinar2. (2020):- The Impact of Health Belief Model-Based Educational Intervention on Women's Knowledge, Beliefs, Preventive Behaviors, and Clinical outcomes. Available at: journals sagepub.com/home/sgo. Accessed on 22 June 2020.

Hernlund, E, Svedbom, A, Ivergard, M, Compston, J, et al. (2017): Osteoporosis in the European Union: Medical management, epidemiology, and economic burden: A report prepared in collaboration with the International Osteoporosis

Foundation (IOF) and the European Federation of Pharmaceutical Industry Associations (EFPIA). Archives of Osteoporosis, 8, Article 136.

Hsieh, E . L, Fraenkel, L, Bradley, E.H & Xia, W, et al . (2018): Osteoporosis knowledge, self-efficacy, and health beliefs among Chinese individuals with HIV Available at http://ard. bmj.com/content/73/Suppl_1. http://ard.bmj.com/content/73/Suppl_ 1/A62.2.abstract?sid=dd1f3954-9a23-47d6-b826-5b9e4d39dd88 accessed on: 10 February 2020.

Hussein, R.D. (2017): Effect of immune enhancement intervention on clinical outcomes of patients with breast cancer undergoing chemotherapy, M.Sc Thesis for Doctoral Degree in Nursing Science, Medical-Surgical Nursing, Faculty of Nursing, Benha University, P: (68).

International Osteoporosis Foundation. (2020):- Cookie Policy – Privacy policyhttps://www.osteoporosis.foundation/patients/about-osteoporosis?utm_source=Enigma&utm_medium=cpc&gclid=EAIaIQobC .Accessed on 5 May 2020.

Jeihooni, A. K, Hidarnia, A, Kaveh, M. H, Hajizadeh, E & Askari, A. (2015): The effect of an educational program based on health belief model on preventing osteoporosis in women. International Journal of Preventive Medicine, 6, Article 115.

Jessup, J.V, Horne, C, Vishen, R.K& Wheeler, D. (2017):- Effects of exercise on bone density, balance, and self-efficacy in older women. Biol Res Nurs; 4(3), PP: (80-171).

John, A& Kibusi, S. (2020): knowledge on Prevention and Management of Preeclampsia and Eclampsia among Nurses in Primary Health Settings, East African health research, 4(1), PP:(33).

Kanis, J. (2019): Assessment of osteoporosis at the primary healthcare level. World Health Organization Collaborating Centre, University of Sheffield.

Kaveh, M.H, Golij, M, Nazari, M, Mazloom Z, et al. (2018): Effects of an osteoporosis prevention training program on physical activity-related stages of change and self-efficacy among university students, Shiraz, Iran: a Randomized Clinical Trial, PP: (64-158).

Kelley, G.A& Kelley, K.S. (2019): Exercise and bone mineral density at the femoral neck in postmenopausal women: a meta-analysis of controlled clinical trials with individual patient data. Am J obstet gynecol, 194(3), PP: (760-7).

Khoshnood, Z, Anoosheh, M, Mohammadi, E & Zadeh, E. H. (2019): A comparative survey of the effect of the education-based program on health belief model for the use osteoporosis preventive behaviors of the girl's osteoporotic and non-osteoporotic mothers. Scholars Journal of Applied Medical Sciences, 3(6), PP: (2200–2206).

Kim K.K, Horan M.L, Gendler, P& Patel, M.K. (1991):- Development and evaluation of the Osteoporosis Health Belief Scale. Research Nurs Health. 1991; 14(2), PP: (155–163).

Kutsal, Y.G, Atalay ,A, Arslan, S, et al.(2020): Awareness of osteoporotic patients. Osteoporosis Int2005; 16(2), PP: (128–33).

Mohamed, N, Omar, H, Abd-Allah, I& Nour, S. (2020): -Mohamed, N, Omar, H, Abd-Allah, I& Nour, S. (2020): Effect of health beliefs model-based education on the control of urinary tract infection among pregnant women, Journal of Nursing and Health Science, 9(5), PP: (42).

National Osteoporosis Foundation. (2018): What is Osteoporosis and What Causes It? Retrieved from https://www. nof.org/patients/what-is-osteoporosis/ .Accessed on 10 May 2020.

Nobakht, M. F, Khani,J . A Haidar, N. A, et al. (2019): Prevalence of osteoporosis and its related factors in women referred to Fasas densitometry center. Scientific Journal of Ilam University of Medical Sciences; 21(4), PP: (8-150).

Porhashem, Z, Biani, M, Noreddini, H, Bijani A& Hosseini, S.R. (2018): Prevalence of osteoporosis and its association with serum vitamin D level in older people in Amirkola, North of Iran. Caspian J Intern Med; 3, PP: (53-347).

Samia, A, Hejar, A. R, Suriani, I, & Emilia, Z. A. (2018): Effectiveness of health belief model-based educational intervention on Osteoporosis Health Belief Scale among female academician in Malaysia. International Journal of Life Sciences Research, 6(3), PP: (464–467).

Sharifikia, I, Rohani, C, Estebsari, F, Matbouei, M, Salmani, F & Nejad, A. H. (2019): Health belief model-based intervention on women's knowledge and perceived beliefs about warning signs of cancer. Asia-Pacific Journal of Oncology Nursing, 6(4), PP: (431–439).

Shawashi1, T.O. & Darawad1, M. (2020):-Osteoporosis Knowledge, Beliefs and Self-efficacy Among Female University Students: A Descriptive Study available at: https://opennursingjournal.com. Accessed on 20 June 2020.

Shuler, F. D, Conjeski, J, Kendall, D, & Salava, J. (2018): Understanding the burden of osteoporosis and use of the World Health Organization FRAX. Orthopedics, 35(9), PP: (798–805).

Winzenberg, T.M, Oldenburg, B, Frendin, S, De WL& Jones, G. (2019): Effects of bone density feedback and group education on osteoporosis knowledge and osteoporosis self-efficacy in premenopausal women: a randomized controlled trial. J Clin Densitom; 8(1), PP: (95-103).

World Health Organization. (2019): Prevention and management of osteoporosis: Report of a WHO scientific group. Available at: https:// apps.who.int/iris/handle/10665/42841?mode=full.

Ziccardi, S. L, Sedlak, C. A & Doheny, M. O. (2020): Knowledge and health beliefs of osteoporosis in college nursing students. Orthopedic Nursing, 23, PP: (128–133).