Preventive Health Behavior and Osteoporosis Prediction among Perimenopausal Women

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Abstract:

Background: Osteoporosis prevention at perimenpauseal period is crucial to diminish the risk of the disease and its complication in later years of life. Having good osteoporosis knowledge and positive health belief may lead to better preventive behavior which then contributes to build and maintain bone health throughout life. **Aim** of the study was to assess preventive health behavior and osteoporosis prediction among perimenopausal women. **Study design:** An analytical cross-sectional study was used. **Setting:** The current study was conducted at obstetrics and gynecologic clinic at the Zagazig university hospital's outpatient clinic. **Sample size:** A purposive of 153 women with inclusion criteria of per-menopausal women age ranged between 35- 45 years. **Five tools** were used to collect the necessary data: an interview questionnaire Osteoporosis Knowledge Assessment, Osteoporosis Health Belief Scale Osteoporosis prevention behaviors Physiological measurement tool for the prediction of osteoporosis. Based on the present study **Results** 31.8% of study subject have osteopenia and 5.9% have osteoporosis, 21.3 % of the studied women had satisfactory level of total knowledge, 59.1% of study subjects had positive attitude and 59.1% had low level of preventative health behavior. **Conclusion and recommendation:** More than one third of study participants have osteopenia and less than ten percent have osteoporosis and more than half had low levels of preventative health behavior. The need for enhancement of the knowledge, attitudes, and osteoporosis protective behaviors of women in early age especially perimenopausal period. Emphasize the importance of routine measurement of BMD and serum calcium level every year for all pre and postmenopausal women.

Key Words: Osteoporosis Prediction, Preventive Health Behavior, Perimenopausal Women

Introduction

Osteoporosis (OP) is a progressive, long-lasting condition. According to its definition, it is a systemic skeletal illness marked by poor bone density and micro-architectural bone tissue degradation, which increases bone fragility and significantly raises the risk of fractures as a result of even minor falls or injuries. **(Khan et al., 2019).** Osteoporosis is defined to exist when Body Mineral Density "BMD" values fall more than 2.5 standard deviations below the young adult mean **(Mitek et al., 2019).**

WHO Criteria for Osteoporosis using BMD (Bone Mineral Density) Classification according to T-Score value: Normal: greater than -1.0, Osteopenia: -1.0 to -2.5, Osteoporosis: less than -2.5, Severe or established osteoporosis: less than -2.5 plus history of fragility fractures **(Keen and Reddivari, 2020).**

In comparison to western nations, the Middle East has a higher prevalence of poor bone m ass.The Middle East and Africa have the high est rates of rickets globally, despite their abu ndance of sunshine.The Middle East and Afri ca have significant rates of hypovitamin D de ficiency, which may be a contributing cause t o osteoporosis
The mortality rates following hip fractures in this area might be greater than those found in communities in the West**Sweileh, WM., et al .(2014)**As a result, the WHO has designated osteoporosis as one of the Middle East's top health priorities, with the goal of raising wom en's awareness and providing them with more training on the disease **(Shawashi and Dara wad, 2020)**

Osteoporosis has become a real well-being medical issue worldwide, affecting 200 million women. In Egypt, 30% of the population was affected, mostly postmenopausal women (54% had osteopenia and 28.4% had osteoporosis) **(El-Tawab et al., 2016).**

In both genders, bone loss begins in the age range of thirty to forty. One theory suggests that within a year of menopause, bone mass and density in women immediately decline. About ten years following menopause, this elevated rate of bone loss approaches equilibrium. This elevated rate of bone loss combines with age-related bone loss after about ten years of menopause. So, women not only suffer from age-related bone loss, but also from menopausal bone loss. **(Kadam etal., 2018)**

Osteoporosis is a silent disease. However, it is also a disease that can be treated and avoided. Identifying risk factors early on is part of prevention. There are two types of risk factors for osteoporosis: modifiable and non-modifiable. Modifiable risk factors include low body weight, falls, smoking, alcohol consumption, prolonged use of corticosteroids and proton pump inhibitors, and being a woman, elderly, ethnic, and in some cases having a family history. **(Hussein R., Wahdan M., 2021).**

It has been determined that the reference "gold standard" method for determining bone mineral density (BMD) is dual-energy X-ray absorptiometry (DXA). Osteoporosis is diagnosed by measuring Bone Mineral Density (BMD) using Dual X-ray Absorptiometry (DXA). About two-thirds of bone strength is determined by areal BMD, which is the bone mineral content divided by the bone area in square centimeters obtained from DXA. Fracture risk rises proportionately as BMD decreases **(Ulivieri et al., 2021).** According to the International Osteoporosis Foundation's standards, premenopausal women should use T scores and be diagnosed with osteoporosis if their T-

score is less than or equal to −2.5**. (Ferrari et al., (2012).**

The management of osteoporotic complications may consume a huge portion of a nation's health-care resources in the future as the number of females represents half of the population. The fundamental requirement for managing any health disorder begins with the assessment of the existing awareness of the disorder within the target subjects residing in a region **(Alshareef et al., 2018).**

Understanding premenopausal women's knowledge and attitudes about osteoporosis, early osteoporosis prediction, and preventative health activities is crucial. hence offering a foundation for educating the general people who are not afflicted with prevention. Among the most significant groups of people who are not ill are perimenopausal women, who are between the ages of 35 and 45. Therefore, future intervention programmes that aim to promote specific behavioural techniques for osteoporosis prevention should prioritise raising awareness of osteoporosis because this will motivate people to seek out more information about the condition and change their lifestyles**. (Mohammed L., & Dauod A.2021)**

Significant of the study

All facets of society are impacted by osteoporosis, including families whose members have the condition, governmental organizations and healthcare facilities across the board. In terms of the expense of therapy and medical care, for instance, it involves the patient, his or her family, and government authorities. It is crucial to give health policymakers a complete picture of osteoporosis prevalence around the world so they may make informed decisions. **(Mohammed ZA et al.,2019).** Osteoporosis is a hidden disease especially in the premenopausal women, as it is associated with risk factors and the prevalence of such problems among adults should not be ignored because of the advantages of early detection and health promotion in additions to the better management. Therefore, this preliminary study aims to assess osteoporosis knowledge, attitude, and preventive health behavior and osteoporosis prediction among per menopausal women.

Aim of the study:

Assess preventive health behavior and osteoporosis prediction among perimenopausal women.

This was accomplished through the specific objective.

Determine the knowledge of perimenopausal women regarding osteoporosis,
Recognize the attitude of perimenopausal regarding osteoporosis prevention
Identify preventive health behavior used by perimenopausal women toward osteoporosis.
Estimate the prevalence of osteoporosis among perimenopausal women **by bone densitometry test**

Research question:

What is the degree of knowledge and attitude of perimenopausal women regarding osteoporosis?

What is the preventive health behavior used by perimenopausal women toward osteoporosis?
What is the prevalence of osteoporosis among perimenopausal women**?**

Subjects and Methods:

Study design: An analytical cross-sectional study was utilized in this study.

Setting: The current research was conducted at obstetrics and gynecologic clinic at the Zagazig University Hospital's outpatient clinic. The obstetrics clinics were in the second floor and provide free and paid services for women (antenatal follow up, gynecological examination and family planning services). The previous mentioned clinics were opened form Saturday to Thursday at 9 am to 2 pm.

Sample size: Total number of per menopausal women attending out-patients clinic of obstetrics department in Zagazig university hospital in six months are 300 women, high level of Osteoporosis Preventive Behaviors was 28.1% **(Elgzar, et al 2023).** With 95% confidence interval, 80% power of test. Sample size calculated to be 153 peri-menopausal women. By using Epi info version7.2.5.0

Sampling technique: A purposive sampling technique consisted of 153 perimenopausal women were used in recruiting study subjects from the above-mentioned settings and according to the eligibility criteria.

Inclusion criteria:

Perimenopausal women ages ranged between 35- 45 years old and accept to participate in the study.

Exclusion criteria:

Women with osteoporosis that were confirmed by clinical examination and diagnostic tests.
Women with mobility problems or had metal implants at the scanning sites.
Women who had a fracture two years before the screening date because their bone health status and lifestyle might be different from subjects without fractures.
Women taking medications like (glucocorticoids, sex hormone replacement, thyroid supplements, thiazide diuretics, anticonvulsants, hyper/hypocalcaemia and hyper/hypo-parathyroidism).

Data collection tools: Five tools were used to collect the necessary data:

Tool I: An interview questionnaire was created by the researchers in plain Arabic to gather the information required to meet the goals of the study. It was divided into two sections:

Section 1: The purpose of section 1 was to gather general information about the study participants through the administration of five questions, including age, education level, marital status, occupation, and income. In addition, women's body mass index was calculated by dividing their weight in kilo grammes by their height in meters squared. The weight to height ratio **(Banack H, et al., 2018).**

Section 2: Reproductive and Family History: Seven questions were asked in this section to evaluate the perimenopausal women's

reproductive history, including their age at menarche, number of parities, manner of delivery, type of lactation, and history of using contraceptives. As well as the family history of osteoporosis.

Tool II: Osteoporosis Knowledge Assessment Tool (OKAT)

This tool was adopted by **(Winzenberg et al 2003)** that was used to measure participant women knowledge regarding osteoporosis. It was written in simple Arabic language and comprises 20 true and false questions with four basic categories: osteoporosis symptoms, risk factors; preventive measures such as physical exercises and a healthy diet; and treatment possibilities. Each right answer got a score of "1", and a wrong answer scored"0". The overall OKAT score ranged from 0 to 20, with a higher score indicating higher knowledge. The internal consistency for the Arabic form of OKAT was **(r = 0.824)· (Sayed-Hassan & Bashour., 2013).** Then the researcher asks about source of knowledge among study subjects.

The total levels of knowledge about osteoporosis were estimated as satisfactory knowledge: for more than or equal 70 % of total scores. unsatisfactory **knowledge**: of less than 70 % of total scores

Tool III: Osteoporosis Health Belief Scale (OHBS): This scale was developed by **(McLeod & Johnson 2011)** and composed of 28 items on seven areas, to assess the attitude of the participant women toward osteoporosis prevention. the seven areas were: susceptibility of osteoporosis, the seriousness of osteoporosis, perception towards benefits and barriers to exercise, perception towards benefits and barriers to calcium intake and health motivation. The response for the items in each subscale range, from strongly disagree awarded 1, to strongly agree awarded 5. The total minimum score was 5, while the maximum was 140.

Scoring system for attitude: A higher OHBS score > 70% indicates a more positive attitude towards bone health. And the lower score <70% negative attitude.

Tool IV: Osteoporosis prevention behaviors (OPB). This tool was developed by the researchers after reviewing related literature **(Yong & Logan., 2021, Pakyar et al., 2021and Stevenson, 2023)** to determine the premenopausal women behavior toward the prevention of osteoporosis .it composed of 8 items focused on: calcium intake, smoking, vitamin D supplement, sunlight exposure, coffee and tea consumption, soft drink consumption and dairy milk intake.

Scoring system for Osteoporosis prevention behaviors: The Preventive Practice Checklist includes 8 items regarding the preventive aspect of osteoporosis. The respondents were asked to tick against their practice to prevent osteoporosis in their lifetime. The scoring was graded as follows: favorable practice (>20) and unfavorable practice (<20 A higher OPB score > 60 % indicates high practice of preventative behavior. And the lower score <60 % low practice of preventative behavior.

Tool V: Physiological measurement tool for the prediction of osteoporosis:

Bone mass density was measured for each individual in the study sample using a peripheral device called peripheral dual-energy X-ray absorptiometry (P-DEXA), which measures bone mass density in the heel bone and is connected to a computer and printer. The process of a DEXA scan is quick and painless. The participant should refrain from taking any calcium supplements for at least 24 hours prior to the exam day. **Available at: https://www.google.com/search?q=%28Peripheral+dual-energy+X-ray+absorptiometry+%28P**

Pilot study: One month was spent doing a pilot research prior to beginning data collection.to check the questionnaire for any changes or issues, as well as to determine how long it will take to gather the data. Twenty individuals made up the pilot study sample; they were not included in the study sample. The pilot study's 0objectives were to determine the tools' viability and identify any peculiarities with the statement, such as its clarity and sequence. Following the pilot study, it was discovered that although certain wording had been changed to improve clarity, the tool questions were still pertinent and understandable. The pilot's outcomes guided the finalization of the data collection form. The main study did not include the pilot sample subjects.

Field work: The perimenopausal women who met the study's eligibility requirements were identified, and after their consent to participate was obtained, the researchers proceeded with the data collection process using the interview questionnaire sheet. The activity was conducted in the waiting area, which was the previously mentioned setting. The women were questioned by the researchers, who wrote out questionnaire forms. Averages of thirty to forty-five minutes are spent interviewing each participant. The researchers used peripheral dual-energy X-ray absorptiometry (P-DEXA) to measure the amount of bone density. The six-month study period ran from the beginning of June 2023 to the end of November 2023.

Validity of the tools: A jury comprised of three specialists from the Faculty of Nursing—two professors from the department of obstetrics and gynecological health nursing and one professor from orthopedics (the faculty of medicine's rheumatology unit)—validated the existing study tools. The clarity, relevance, comprehensiveness, applicability, and understanding of the instrument were evaluated by these experts. Every suggested adjustment to the instruments was made.

Reliability of the tools: The reliability of the tools used through testing their internal consistency. Their reliability proved to be

high as shown by the values of cronbach's alpha coefficient. The values were revealed as follows: **Osteoporosis Health Belief Scale** (0.86), and **Osteoporosis prevention behaviors** 0.84.

Ethical consideration:

On November 2022, Research Ethics Committee (REC) in Zagazig University examined and approved the study and gives it ethical code number 68. During their meeting, the researchers asked the volunteers to participate and gave them all the information they required regarding the goals and methods of the study. After being told that participation is completely voluntary and that they can quit at any moment, for any reason, and without repercussions, they verbally agreed to take part. Every participant received assurances that the data they provided would be kept private and utilized exclusively for the objectives of the research. There is no possibility that the study procedures may harm participants in the real or imagined future.

Administrative design

Permission to collect the study sample was formally given by submitting an official letter from the dean of faculty of nursing to the director of the outpatient clinic Zagazig University hospital. The purpose of the study in respect to ethical considerations was explained to the participants through meetings and conversations between the researchers and the participants.

Results

Table (1) shows that, 58.8 % of the studied women their age ranged between 40-45 years. As regards to educational level, 43.1 % of them had secondary school education. In relation to marital status, it was found that, 67.3% of them were married. Moreover 64.1 % of the studied females were employees and 52.3% had enough outcomes.

Figure 1 displays that, 38.1 % of the studied sample had normal BMI where 61.9% of them had abnormal BMI between overweight and obese

Table (2) displays that, 57.7% of the studied women had more than two parity. Additionally, 66.7% of women had C.S as mode of last delivery. And nearly the same percent of the studied women lactating their baby by breast feeding 37.1% and artificially 39.3% methods. As well as 76.5% the studied women using contraception family planning methods in the form of hormonal 30.9%, IUD 27.7% and both of them 29.7%. Moreover, 37.3 % of the studied women had family history of osteoporosis.

Figure (2) shows that internet and physicians were the most common source of knowledge about osteoporosis among study subjects (48.3%&30.2% respectively)

Table (3) shows that, there was around one nearly half of the study subjects reported don't know in first half items of **the OKAT** questionnaire.

Table (4) shows that, there was around one nearly half of the study subjects reported don't know in second half of items of **the OKAT** questionnaire.

Figure (3) shows that, 21.3 % of the studied women had satisfactory level of total knowledge about osteoporosis and 78.7% of them had unsatisfactory level of total knowledge.

Table 5 shows distribution of studied women according to osteoporosis health belief scale, nearly three quarter of the study subject reported strongly or agree susceptibility and seriousness of osteoporosis& benefit of exercises and calcium intake.

As completion osteoporosis health belief scale, **table 6** shows distribution of studied women according to osteoporosis health belief scale, nearly half of the study subject reported strongly or agree with some items of barriers to exercise and calcium intake& health Motivation

Figure (4) shows that there were 59.1% studied women shows positive attitude by Osteoporosis Health Belief Scale (OHBS) compared to 40.9% shows negative attitude.

Table 7 reveals distribution of studied women related to osteoporosis preventive behaviors. 65.5% of the studied women didn't practice any type of exercise. Additionally, there were 60.8% of them either active or passive smoker. And only 24.8% of them take vitamin D supplement. As regard sunlight exposure all of the study subjects exposed to sunlight and more than half of them 65.5% expose to sunlight daily.

Table 8 presents that, 92.2 % of the study subjects use dairy and milk products daily. But 38.5% of the study subjects drink soft-drink daily and 92.1% report excessive consumption of coffee and tea.

Figure (5) Presents that 35.9 % of study subjects shows high score of preventive behaviors toward osteoporosis compared to 64.1% shows low score.

Figure (6) presents that 5.9 % and 31.8 % of studied women suffered from osteoporosis and osteopenia

Table (9) shows that, there was statistically significant relation between studied female's total knowledge about osteoporosis and their age, educational level, monthly income and occupational status at ($P = < 0.05$). While, there was no significant relation between studied female's total knowledge about osteoporosis with their marital status at ($P = >0.05$)

Table (10) shows that, there was highly significant positive correlation between their total score of knowledge about osteoporosis of the studied female and their total score preventive behaviors and their total attitude score ($P = < 0.01$). As women who have satisfactory knowledge shows satisfactory preventive behaviors score and positive attitude score

Table (1) Demographic Characteristics of the Studied Sample (n=153).

Variable	Number	Percent
Age (in years):		
35-40	63	41.2
>40-45	90	58.8
Mean ±SD	40.60 ± 2.12	
Education		
Illiterate& Primary	43	28.1
Secondary	66	43.1
University	44	28.8
Marital status		
Married	103	67.3
Un married	50	32.7
Occupation		
Employee	98	64.1
Housewife	55	35.9
Income		
Not enough	42	27.5
Enough	80	52.3
Enough and save	31	20.2

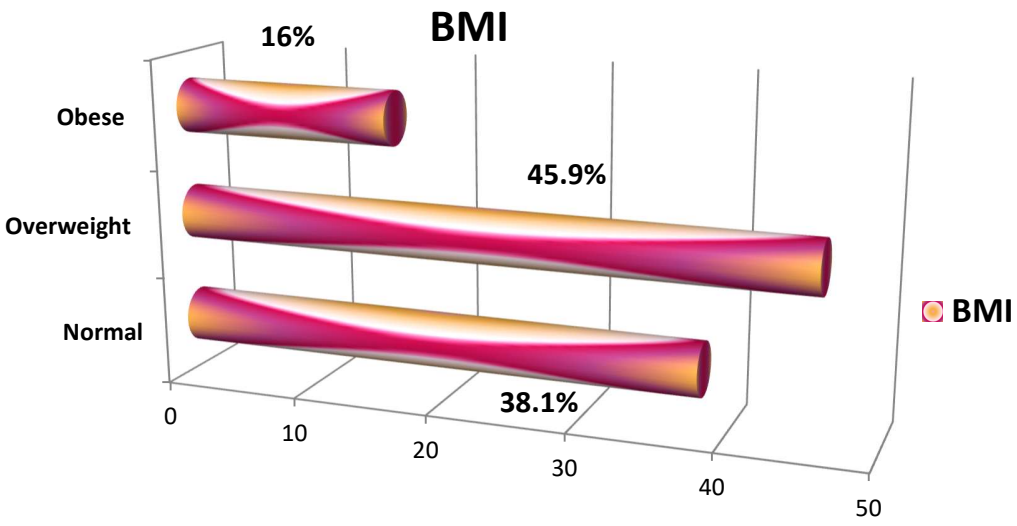

Figure (1): Body mass index of the Studied Sample (n=153)

Table (2) Distribution of studied women related to their obstetric, contraceptive and family history (N= 153)

Items	N	%
Number of parity		
0 -2	65	42.3
>2	88	57.7
Mode of last delivery (N= 132)		
Vaginal	44	33.3
CS	88	66.7
Type of lactation (N= 132)		
Breast feeding	49	37.1
Artificial	52	39.3
Both together	31	23.6
History of family planning methods (N= 132)		
Yes	101	76.5
No	31	23.5
Type of family planning methods (N= 101)		
Hormonal	31	30.9
IUD	28	27.7
Both methods	30	29.7
Other	12	11.7
Family history of osteoporosis		
Yes	57	37.3
No	96	62.7

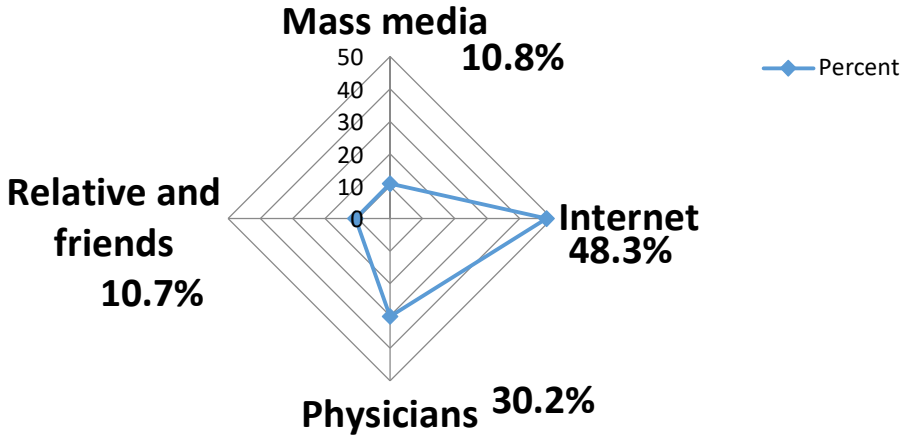

Figure (2) Source of Knowledge about Osteoporosis among Study Subjec

Table (3) Distribution of studied women according to their response to the OKAT Items

OKAT items		Yes (%)	No (%)	Don't know (%)
1	In men, osteoporosis is more prevalent.	**35**	**22.3**	**42.7**
2	Being physically active helps prevent osteoporosis.	**15.6**	**54.1**	**30.3**
3	Bone fracture risk is enhanced by osteoporosis.	**20.8**	**49.1**	**30.1**
4	In "Egypt," there are no proven osteoporosis treatments available.	**19.8**	**45.**	**35.1**
5	Based on my clinical risk factors, determining my risk of osteoporosis is straightforward.	**15.6**	**54.1**	**30.3**
6	A greater peak bone mass at the end of childhood does not shield a person from developing osteoporosis later in life.	**19.8**	**55.1**	**25.1**
7	For those who are intolerant to dairy products, sardines and broccoli are excellent sources of calcium.	**15.6**	**54.1**	**30.3**
8	Calcium supplements alone can prevent bone loss	**30.5**	**22.3**	**47.2**
9	A person is more predisposed to osteoporosis if they have a family history of the condition.	**19.8**	**45.1**	**35.1**
10	Usually, before fractures happen, osteoporosis produces symptoms like pain.	**32.5**	**20.3**	**47.2**

Osteoporosis Knowledge Assessment Tool (OKAT)

Table (4) Distribution of studied women according to their response to the OKAT Items (cont.)

OKAT items		Yes (%)	No (%)	Don't know (%)
11	Moderate alcohol use has little impact on osteoporosis.	**19.8**	**45.1**	**35.1**
12	Smoking cigarettes has been linked to osteoporosis.	**19.1**	**40.9**	**40.1**
13	It is possible to consume enough calcium by drinking two glasses of milk each day.	**19.1**	**50.9**	**30.0**
14	One risk factor for osteoporosis is consuming a lot of salt	**15.6**	**54.1**	**30.3**
15	In comparison to other racial groups, white women had the highest risk of fractures.	**19.1**	**40.9**	**40.1**
16	Low bone strength and falls are equally essential in causing fractures.	**15.6**	**54.1**	**30.3**
17	By age 80, the majority of women have osteoporosis	**19.1**	**40.9**	**40.1**
18	In the ten years that follow menopause, there is a slight loss of bone mass.	**32.5**	**25.3**	**42.2**
19	Most women can anticipate at least one fracture before they pass away starting around age 50.	**15.8**	**55.1**	**30.1**
20	Following menopause, hormone therapy stops additional bone loss at any age.	**19.1**	**40.9**	**40.1**

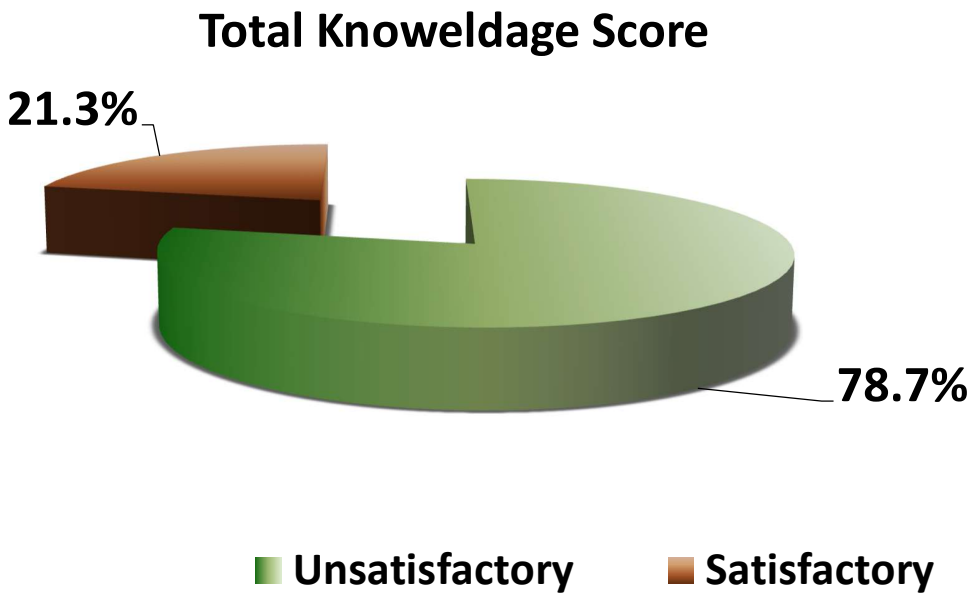

Figure (3) Total knowledge score about Osteoporosis among Study Subjects

Table (5):- Distribution of studied women according to Osteoporosis Health Belief Scale (OHBS) (N=153)

Items	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Susceptibility of Osteoporosis					
Females are more likely to get the osteoporosis disease	48.2	20.8	13.7	13.2	5.1
Because of my body build, I am more likely to develop osteoporosis	39.2	37.8	10.0	7.8	5.2
Family history makes us more likely to get osteoporosis	21.9	33.7	20.2	12.0	12.2
After menopause, the chance of developing osteoporosis increases.	48.2	25.8	11.8	5.9	8.3
Seriousness of Osteoporosis					
The thought of having osteoporosis scares me	21.9	33.7	20.2	12.0	12.2
My feelings about myself would change if I got osteoporosis	11.5	25.7	35.1	14.3	13.4
It would be very costly if I got osteoporosis	19.8	35.8	17.6	12.9	13.9
It would be very serious if I got osteoporosis	8.3	15.8	21.8	5.9	48.2
Perception towards benefits to exercise					
Regular exercise prevents problems of osteoporosis	39.2	37.8	10.0	7.8	5.2
Regular exercise helps to build strong bones	21.9	33.7	20.2	12.0	12.2
I feel better when I exercise to prevent osteoporosis	40.2	21.8	12.8	16.2	9.0
Exercising to prevent osteoporosis improves the my body looks	38.2	30.8	10.8	14.2	6.0
Perception towards benefit to calcium intake					
An eating calcium rich food helps to build bones	40.2	28.8	13.5	10.2	7.3
Eating calcium rich foods reduces risk of broken bones	43.2	15.8	10.8	17.2	13.0
Eating calcium rich foods prevents osteoporosis	48.2	20.8	13.8	17.2	21.9

OHBS: Osteoporosis Health Belief Scale

Table (6) cont.:- Distribution of studied women according to Osteoporosis Health Belief Scale (OHBS) (N=153)

Items	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Perception towards barriers to exercise					
I feel that I'm not strong enough to do exercise regularly	39.2	27.8	20.0	6.8	3.2
My family members discourage me for exercises	11.7	20.8	28.8	17.2	21.5
Exercising regularly is a new habit and is hard to do	32.5	25.8	13.8	12.2	15.7
Exercising regularly upsets my every day routine	21.9	33.7	20.2	12.0	12.2
Perception towards barriers to calcium intake					
Calcium rich foods are too expensive	48.2	20.8	13.8	17.2	21.9
Eating calcium rich foods means changing your diet which is hard for me to do	21.9	33.7	20.2	12.0	12.2
I do not like calcium rich foods	12.2	15.8	29.8	30.0	12.2
To eat more calcium-rich foods I have to give up other foods I like	21.9	33.7	24.2	10.0	10.2
Health Motivation					
Look for new health information/t health	48.2	25.8	11.8	5.9	8.3
Do regular check-up even when I am not sick	12.2	15.8	29.8	30.0	12.2
Follow recommendations to keep healthy	21.9	33.7	20.2	12.0	12.2
Keeping healthy is very important to me	50.2	23.2	10.3	8.0	8.3
Try to discover health problems early	40.1	24.1	17.5	12.5	5.8

OHBS: Osteoporosis Health Belief Scale

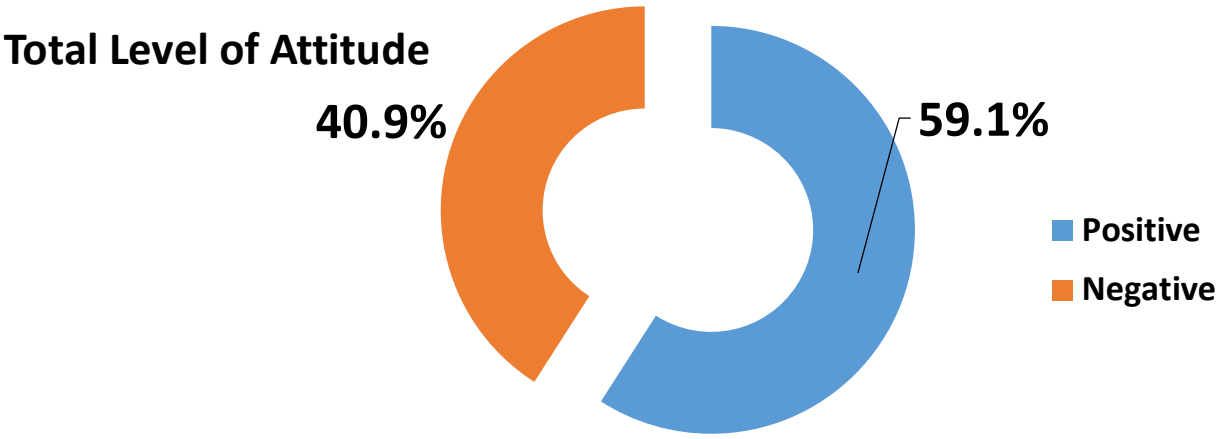

Figure (4) Distribution of studied women according total score of Osteoporosis Health Belief Scale (OHBS) (N=153)

Table (7) Distribution of studied women related to Osteoporosis preventive behaviors (N=153)

Items	N	%
Exercise		
≥3 day/week	20	13.0
1-2 times/week	33	21.5
None	100	65.5
Smoking		
Yes	21	13.7
No	60	39.2
Passive smoking	72	47.1
Vitamin D supplement		
Yes	38	24.8
No	115	75.2
Sunlight exposure		
Under direct sunlight	51	33.3
Indirect sunlight	102	66.7
Sunlight exposure duration		
Daily	100	65.5
1-3 times /week	53	34.5
None	0	0.0

Table (8) cont.: - Distribution of studied women related to Osteoporosis preventive behaviors (N=153)

Items	N	%
Dairy and milk products consumption		
None	12	7.8
≥ 3 servings /day	79	51.6
< 3 servings /day	62	40.6
Soft drink consumption		
≥3 servings/day	18	11.7
1 serving/day	59	38.5
4-5 servings/week	44	28.7
2 servings/week	32	21.1
Excessive consumption of coffee and tea		
Yes	141	92.1
No	12	7.9

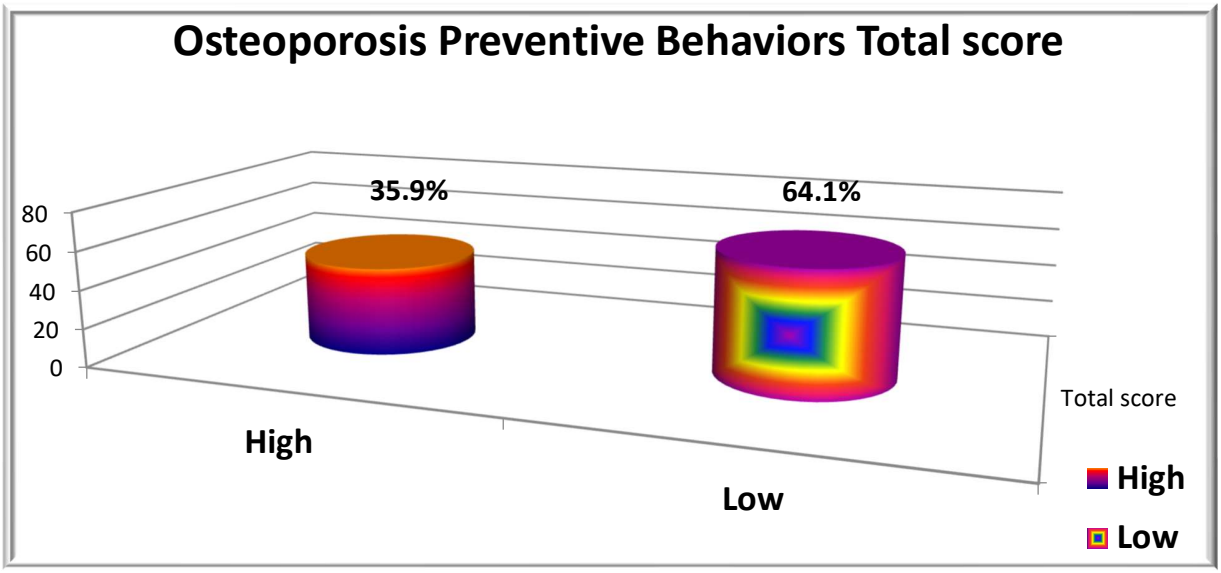

Figure (5): Distribution of studied women according to their total score of osteoporosis preventive behaviors

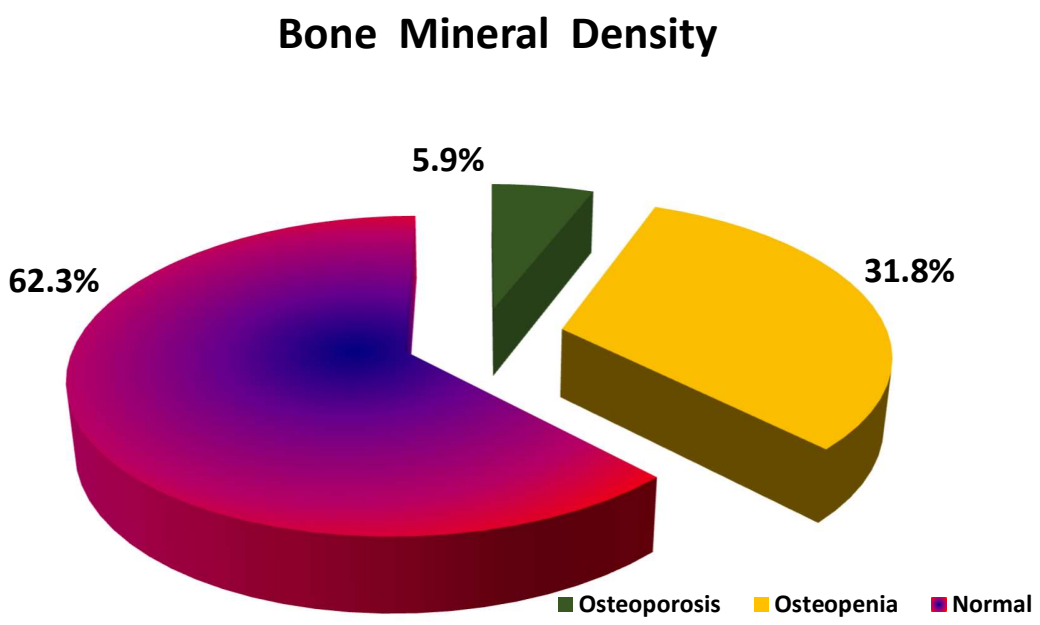

Figure (6): Distribution of the study subjects regarding their bone mineral density

Table (9): Relation between demographic characteristics of the studied female and their total knowledge about osteoporosis.

Variable	Total knowledge				X2	p-value
	Satisfactory		Unsatisfactory			
	No	%	No	%		
Age (in years):						
35-40y	55	35.9	8	5.2	7.85	.012*
40-45y	18	11.7	72	47.2		
Education						
Illiterate& Primary	12	7.8	31	20.2	9.97	.001**
Secondary	17	11.2	49	32.1		
University	32	20.9	12	7.8		
Marital status						
Married	54	35.2	49	32.1	4.631	.160
Un married	28	18.4	22	14.3		
Occupation						
Employee	61	39.8	37	24.1	7.93	.091*
Housewife	25	16.5	30	19.6		
Income						
Not enough	14	9.1	28	18.4	8.74	.051*
Enough	64	41.8	16	10.4		
Enough and save	23	15.1	8	5.2		

Table (10): Correlation between total knowledge, preventive behaviors, attitude regarding osteoporosis among the studied female.

Variable	Correlation	P- Value
Total attitude score	**0.753**	**p=<0.001**
Total knowledge score		
Total preventive behaviors score		

Discussion

Osteoporosis is a systemic skeleton disease characterized by the bone mass decrease and bone structure changes, which results in higher inclination to bone tissue fractures **(Esad Alibasic et al., 2020).** According to the World Health Organization, osteoporosis is one of the most serious diseases associated with the advancement of civilization in the modern era. While osteoporosis can afflict men as well, women make up 80% of cases. The disease's asymptomatic progression is often known as "the silent thief of the bone." Modifiable risk factors for osteoporosis include long-term inactivity, smoking, alcohol abuse and poor nutrition, low levels of calcium and vitamin D, and use of fizzy beverages.

Some of the numerous factors associated with low compliance, however, include gender, family history, ethnicity, race, adulthood, menstrual status, and body size; knowledge of osteoporosis risk factors and prevention is thought to bridge the gap between guidelines, practical physiotherapy, and clinical practice. **(Ranbhise N. et al., 2020).**

According to the study's demographic data, over half of the women under investigation were between the ages of 40 and 45. In terms of education, about half of them had completed secondary school. Furthermore, half of them had sufficient results, and nearly three quarters of them were married and working. The researchers' inclusion criteria indicated that perimenopausal women in this age group were at high risk of osteoporosis and were likely to know little about preventive measures.

This is consistent with **El-Tawab S. et al., (2016)** in Alexandria, Egypt study on women's awareness of osteoporosis: According to a community-based survey, the average age of the women under study was 49.92 ± 7.75 years, with a range of 40–76 years. Approximately 75% of the women in the study were married, according to their marital status. In addition, a study by **Hyassat et al., (2017)** titled Osteoporosis Prevalence and Risk Factors among Jordanian Postmenopausal Women revealed that 90% of its participants were married and had only completed secondary education.

Regarding BMI the present study found that while over one-third of the participants had normal BMIs, over half had aberrant BMI falling between overweight and obese. These findings could be attributed to physiological changes that occur during the premenopausal era, which increase the risk of weight gain. This finding supported by **Alebshehy R., et al., (2016)** who found that increasing BMI is associated with aging in Egypt. The increasing trend of female obesity reaches its maximum at the age of 45- 54 years, when 62% of females become obese. However, in India, **Garje K., Autade Y., Kolage A., et al. (2022)** conducted a study to determine the risk factors for osteoporosis and the knowledge and practices related to osteoporosis prevention among pre-menopausal and postmenopausal women with breast cancer. The study's findings indicate that the study subjects' BMI distribution was 64.0% of the BMI scale range of 18.5–24.9, and 22.0% of the participant BMI is 25–29. 9.

According to the current study's results, over half of the women who were evaluated had more than two pregnancies and a C.S. as their last delivery method.

Not only that, but three quarters of the women in the study used family planning methods of contraception, such as hormonal, IUD, or both. Approximately 59% of married women in Egypt today use contraception, according to a prior study backed by data from the 2014 EDHS. The pill, injectable, and IUDs are the most often used techniques. Furthermore, the results corroborated those of **Hassanine et al., (2017)** in their study which done at El-Fayoum City, Egypt who found that almost one-third of the study group had given three or four time.

Regarding information sources, research participants most frequently learned about osteoporosis from doctors and the internet. Social media's pervasive use and accessibility to all societal segments have led to the perception of the Internet as a source of information, albeit often incomplete information provided by non-specialists. This was confirmed by a related study carried out in Saudi Arabia by **Alamria FA et al., (2015)** which found that the primary sources of knowledge were healthcare providers (27%), followed by family members or friends (23.7%), the internet (21.5%), and television (19%).

Concerning **total knowledge score** about osteoporosis among study subjects only near one quarter of the studied women had satisfactory level of total knowledge about osteoporosis and the rest of them had unsatisfactory level of total knowledge. The research findings align with a previous investigation conducted by **Ramli et al. (2018)** concerning participants' knowledge, attitudes, and practices related to osteoporosis in Malaysia. That study found that participants' mean overall knowledge score on the condition was 35.62 (SD=2.87), indicating a moderate to fair level of knowledge. The study's results, according to **Embong H. (2021),** also show that 40.5% of participants had high awareness of osteoporosis and 53.5% had poor practice.

According to the Osteoporosis Health Belief Scale (OHBS), over half of the women in the study had a positive attitude towards osteoporosis prevention, while less than half had a negative attitude.

Conversely, **Al-Hemyari et al. (2018)** conducted a study in the United Arab Emirates titled "Assessment of Knowledge, Attitude, and Practice of Osteoporosis and Its Predictors." The study's findings indicated that the level of information, attitude, and practice around osteoporosis was good. A portion of the KAP items received low scores. On the same note, **Sitati F., Obimbo M., Gichangi P., (2021)** noted that the women in this study showed a lack of understanding of osteoporosis. Osteoporosis prevention and therapy in this population are complicated by the low susceptibility score. However, 62.5% of the participants in **Abdo HA., & Idris SM., (2022)** study regarding adult patients in Sudan's knowledge, attitude, and practice regarding osteoporosis were aware of the condition.

Regarding the osteoporosis preventive behaviors the study participants reported, over one-third of them scored highly on these behaviors, while two-thirds scored poorly. These results are similar to a study by **Mohammed L. and Dauod A. (2021)** on osteoporosis knowledge, awareness, and preventive behaviors among a sample of premenopausal women in Erbil City,

Iraq. The study found that most premenopausal women in Erbil City knew very little about osteoporosis, but were unaware of risk factors for the disease and inadequate preventive measures. Additionally, **Panda et al.'s (2022)** study on women's knowledge of osteoporosis in a low- to middle-income nation discovered that participants' understanding of the significance of implications of osteoporosis, risk factors, and preventive strategies.

In terms of bone mineral density, 5.9% and 31.8% of the women in the study had osteoporosis and osteopenia, respectively. The findings of **Chan et al., (2019)** Malaysian study, which found that 12.3% of participants had osteoporosis and 28.0% of participants had osteopenia, were consistent with our findings. However, **Hassan et al., (2020)** study in Egypt on the early identification of osteoporosis in premenopausal Egyptian women revealed that 47% of the participants in the study had normal weight and bone density, 42.5% had osteopenia, and 10.2% had osteoporosis.

Regarding the relationship between the stu dy's female participants' demographics and their overall level of osteoporosis knowled ge.

The study found a statistically significant c orrelation between the overall osteoporosis knowledge of the female participants and t heir age, educational attainment, monthly i ncome, and employment status. Nonetheles s, there was no discernible association found between the female participants' marital status and their understanding of osteoporosis. In a similar direction**, Abdo HA., & Idris SM., (2022)** who found that age, gender, and educational attainment all had a significant impact on adult patients' knowledge, attitudes, and practices about osteoporosis. A different study on osteoporosis knowledge, attitudes, and practices among Saudis was carried out in Majmaah City, Saudi Arabia by **El-Tohami K. (2015).** The study found that greater education levels were associated with increased awareness of osteoporosis ($P<0.001$).In the light of the According to the results of the current study, there was a highly significant positive link between the investigated female's overall knowledge score about osteoporosis and her total scores for preventative behaviors and attitude. Women with adequate knowledge exhibit positive attitudes and preventive behaviors that are rated as satisfactory. This conclusion is corroborated by **Gai et al., (2020)** education intervention for osteoporosis in older individuals, which found that patient education could improve adherence to preventative behaviors and raise patients' knowledge and awareness of osteoporosis. Additionally, **Park and Park (2019)** showed a positive correlation between knowledge of osteoporosis and self-efficacy for exercise in their study conducted in Korea to examine the relationships between outcome expectations for exercise, self-efficacy for exercise, and knowledge of osteoporosis in older women with the disease

Conclusion: The current study's findings lead to the following conclusions: in terms of osteoporosis prediction, more than one third of study participants have osteopenia and less than ten percent have osteoporosis. The women under study's general osteoporosis knowledge, attitudes, and preventive health behaviors. Among

the study subjects, more than half had a good attitude, nearly one quarter of the women had sufficient knowledge, and more than half had low levels of preventative health behavior.

On then light of results of the current study recommended that:

- Comprehensive effective programs on the importance of nutrition, calcium and vitamin D intake, and exercise in the prevention of osteoporosis can be implemented for women in pre and during reproductive age.
- As prevention is better than cure regular educational reinforcement and a longer period of follow-up to enhance the knowledge, attitudes, and osteoporosis protective behaviors of women in early age. - Emphasize the importance of routine measurement of BMD and serum calcium level every year for all pre and postmenopausal women is needed for early detection and prevention of osteoporosis.
- A similar study can be replicated in other settings with different age groups

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