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KNOWLEDGE AND AWARENESS LEVEL OF OSTEOPOROSIS RISK FACTORS AMONG SAUDI WOMEN

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Abstract

Introduction: Osteoporosis is a progressive disorder of the skeletal system marked by a reduction in bone density and a deterioration of the microarchitecture of bone structure. It is considered the tenth most prevalent disease in the world, and it is more frequent in women aged 50–80 than in men. Many Recent cross-sectional surveys aimed to assess women's general awareness and knowledge of osteoporosis and its prevention. **Objectives:** The Study aims to assess the knowledge and awareness of osteoporosis among Saudi women. **Methodology**: This is a cross-sectional research Conducted from July to December 2024. Data for this research collected by using the Osteoporosis Knowledge Assessments Tool (OKAT). The women who included to take part in the research are Saudi women, who are at least 18 years old, but not more than 65. We exclude men as well as women who work or study in healthcare-related jobs. Using the Qualtrics calculator with a 95% confidence level, and 5% margin of error, the minimal number of samples is 384.

Results: In our study on the knowledge and awareness of osteoporosis risk factors among Saudi women, we surveyed 433 participants, revealing alarming gaps in understanding. Only 1.8% demonstrated high awareness, with 62.4% exhibiting low knowledge of osteoporosis risk factors, despite 95.6% acknowledging its link to fractures. Notably, while 43.9% recognized hormone therapy's potential benefits, 47.6% were uncertain. Significant relations were found between knowledge and variables like age, employment status, and information sources. **Conclusion:** The findings of this study underscore a critical need for enhanced educational initiatives aimed at increasing knowledge and awareness of

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osteoporosis risk factors among Saudi women. Despite a high level of education within the participant group, the low awareness scores indicate that educational attainment alone is insufficient to ensure understanding of health issues.

Keywords: Knowledge, Awareness, osteoporosis, Saudi women, Saudi Arabia.

Introduction:

Osteoporosis is a systemic skeletal disorder characterized by Low bone density and increasing micro-architectural degeneration of bone tissue, that increase risk of weak bones and fractures [1].

Osteoporosis is ranked as the tenth most prevalent disease in the world that has been linked to contemporary civilization by the WHO [2]. It is among the nutritional deficiencies that are most underdiagnosed and undertreated globally [3]. The onset of this condition differs based on age, with older women being the most affected, and it can cause osteoporotic fractures at several sites, including the hip, spine, forearm, and proximal humerus [4]. There are 200 million osteoporosis sufferers in the world, and the rate of this disease in Saudi Arabia is estimated to be between 21.4% and 30.7% among healthy men and between 34% and 39.5% of women aged 50 to 80 [5].

In 2023, an observational cross-sectional survey found that women had an intermediate degree of awareness about osteoporosis and preventative methods. Medical websites and social media have also been established to be valuable sources of knowledge [6]. An observational, cross-sectional study was done in 2023 and revealed that women have a fair understanding of osteoporosis, misunderstandings about specific aspects of the disease, and a lack of information, especially regarding risk factors [7]. In 2021, a cross-sectional survey of female university students revealed osteoporosis misconceptions as well as a lack of understanding and lifestyle patterns related to the disease [8].

To some extent, research indicated that osteoporosis might be regarded as a preventable condition, highlighting the necessity of raising knowledge in society at large. The purpose of this study is to evaluate Saudi Arabian women's knowledge and awareness of the risk factors for osteoporosis.

Objectives:

The study aims to assess the knowledge and awareness level of Osteoporosis risk factors among Saudi Arabian women.

Methodology:

Study Design and Setting:

This is a cross-sectional research target Saudi women between the ages of 18 and 65. The study conducted between July-December 2024.

Subject: Participants, recruitment, and sampling procedure:

The study's population include Saudi women who are between the ages of 18 and 65 years old.

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Sample size:
Using the Qualtrics calculator with a 95% confidence level, and 5% margin of error the minimum sample size was calculated to be 384.
The Sample size was estimated by using this formula:
n= P (1-P) * Zα 2 / d 2 with a confidence level of 95%.
n: Calculated sample size
Z: The z-value for the selected level of confidence (1- a) = 1.96. 8 P: An estimated knowledge
Q: (1 – 0.50) = 50%, i.e., 0.50
D: The maximum acceptable error = 0.05.
So, the calculated minimum sample size was:
n = (1.96)2 X 0.50 X 0.50/ (0.05) 2 = 384.

Inclusion and exclusion criteria:
The study's inclusion criteria as follows: Saudi women aged 18 or older, and not more than 65 years old, also they should not be healthcare workers or health-related specialty students. This study exclude non-Saudi females, also women below the age of 18 and those over the age of 65, as well as health-care workers, and males.

Method for data collection, instrument, and score system:
The Osteoporosis Knowledge and Awareness Tool (OKAT) was developed and designed from previous published research [9,10] . It measures knowledge and awareness of risk factors for osteoporosis. The Questionnaire includes 20 items. The first 12 questions assess knowledge of osteoporosis, the remaining 4 questions assess attitudes toward osteoporosis, and the final 4 questions assess prevention practices and perception. The questionnaire available in both languages English and Arabic.

Scoring system:
For all the 20 multiple-choice Questions, there three answers: “true”, “false”, and “I don't know”. For giving the correct answer 1 score, and for both the incorrect and "I don't know" answers 0 scores, The total is 20 scores. Basing on Bloom's cutoff points, the participants who answer 100% to 80% (17-20) of the questions correctly considered as high knowledge, 79% to 60% (15.8-12) are moderate knowledge, less than 60% (11-0) are poor knowledge.

Pilot test:
The survey given to 20 individuals who asked to complete it. This help us evaluate the clarity of the survey and determine if the study is feasible. The data gathered from this initial study not be included in the final analysis.

Analyzes and entry method:
We use the SPSS (version 24.0) software to code, load, and analyze the data. Also, various statistical

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models used to analyze the data and results. Descriptive statistics used to calculate mean values, variances, and standard deviations.

Results:

Table (1) displays various demographic parameters of the participants with a total number of (433). The data shows participants have a broad age spectrum between ages 22 and 59 with an average age of 35.1 years and a typical spread of 13.6 years. Half of them is between 33 and 45 years old. The survey shows that married people make up most of the population (49.2%) with a second half of single people (42.5%) who maintain a stable social profile. Our research sample includes only Saudi participants which helps us better understand how culture shapes our findings. Among the participants 36.5% earned 5,000 SAR or less every month, which reveals potential economic hardship. The high education levels in our results demonstrate that 60.7% of participants achieved a bachelor's degree. The job market data shows worrying signs when 26.1% of participants lack employment stability. People now increasingly access knowledge through social media rather than other traditional means.

Table (1): Sociodemographic characteristics of participants (n=433)

Parameter		***No.***	***Percent (%)***
Age (Mean:35.1, STD:13.6)	22 or less	110	25.4
	23 to 32	101	23.3
	33 to 45	117	27.0
	46 or more	105	24.2
Marital status	Single	184	42.5
	Married	213	49.2
	Divorced	19	4.4
	Widowed	17	3.9
Nationality	Saudi	433	100.0
	Non-Saudi	0	0
Monthly income in SAR	Less than 5000	158	36.5
	5000 to 10000	99	22.9
	10000 to 15000	55	12.7
	More than 15000	62	14.3
	I don’t know	59	13.6
Living in	Rented Apartment	87	20.1
	Own Apartment	76	17.6
	Rented villa	25	5.8
	Own Villa	209	48.3
	Other	36	8.3
Educational level	Primary school	4	.9
	Middle school	12	2.8

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	High school	81	18.7
	Diploma	37	8.5
	Bachelor's degree	263	60.7
	Postgraduate degree	31	7.2
	Uneducated	5	1.2
Occupational status	Student	89	20.6
	Student in health major	49	11.3
	Employee in health sector	29	6.7
	Employee in non-health sector	85	19.6
	Freelance	21	4.8
	Unemployed	113	26.1
	Retired	47	10.9
Residential region	Northern region	21	4.8
	Southern region	103	23.8
	Central region	131	30.3
	Eastern region	88	20.3
	Western region	90	20.8
Source of knowledge	Social media	175	40.4
	Physician	91	21.0
	Friends	22	5.1
	Relatives	71	16.4
	Patients	19	4.4
	Other	55	12.7

As shown in figure 1, when asked if osteoporosis puts people at higher risk for broken bones, 414 said yes, making up 95.6% of the participants we surveyed. In stark contrast, only 4 respondents, representing around 0.9%, disagreed with this assertion, while 15 individuals, or roughly 3.5%, indicated uncertainty by selecting "I don't know".

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Figure (1): Illustrates whether osteoporosis increases the risk of bone fracture according to participants.

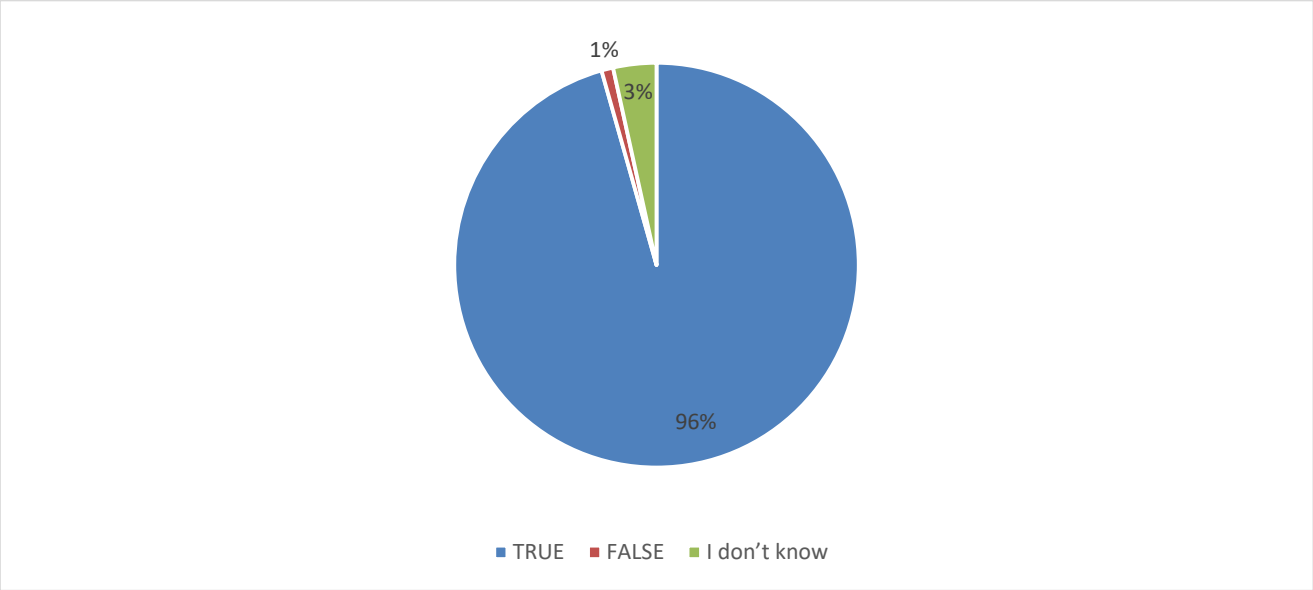

Table 2 shows how Saudi women know and understand the osteoporosis risk factors, both positively and negatively, from a statistical perspective. Most women (95.6%) knew that having osteoporosis means bones are more likely to break, showing they understand the basics about this condition. Even though most people know osteoporosis raises fracture risk (95.6%), they lack understanding about how peak bone strength influences osteoporosis risk, as revealed by the 50.3% who are unsure about it. Also, just 27.5% recognized that any physical activity can help prevent osteoporosis, showing we need to teach people more about how their everyday choices affect their bones. Only a small number of people are aware that men can develop osteoporosis just as frequently as women do. According to the results, a disturbing number of people (51.3%) don't know if any proven medical treatments are available for osteoporosis in Saudi Arabia.

Table (2): Parameters related to knowledge and awareness level of osteoporosis risk factors among Saudi women (n=433).

Parameter		***No.***	***Percent (%)***
1.Osteoporosis increases the risk of bone fractures.	True	414	95.6
	False	4	.9
	I don't know	15	3.5
2. Osteoporosis typically leads to symptoms such as pain before fractures occur.	True	310	71.6
	False	40	9.2
	I don't know	83	19.2
	True	147	33.9

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3. Having a higher peak bone mass at the end of childhood does not provide protection against the development of osteoporosis in later life.	False	68	15.7
	I don't know	218	50.3
4. Men are more commonly affected by osteoporosis.	True	39	9.0
	False	310	71.6
	I don't know	84	19.4
5. Smoking cigarettes can increase the risk of developing osteoporosis.	True	293	67.7
	False	24	5.5
	I don't know	116	26.8
6. White women have the highest risk of fractures compared to women of other races.	True	140	32.3
	False	75	17.3
	I don't know	218	50.3
7. The risk of falling is just as significant as having low bone strength in causing fractures.	True	274	63.3
	False	60	13.9
	I don't know	99	22.9
8. When women reach the age of 80, the majority of them have osteoporosis.	True	346	79.9
	False	29	6.7
	I don't know	58	13.4
9. Most women aged 50 and older can expect to experience at least one fracture during their lifetime.	True	180	41.6
	False	117	27.0
	I don't know	136	31.4
10. Engaging in any form of physical activity is beneficial for osteoporosis.	True	119	27.5
	False	227	52.4
	I don't know	87	20.1
11. It is easy to determine if I am at risk of osteoporosis based on my clinical risk factors.	True	301	69.5
	False	47	10.9
	I don't know	85	19.6
12. A strong family history of osteoporosis increases the risk of developing osteoporosis.	True	235	54.3
	False	87	20.1
	I don't know	111	25.6
13. You can meet your calcium needs by drinking two glasses of milk per day.	True	271	62.6
	False	74	17.1
	I don't know	88	20.3
14. Sardines and broccoli are excellent sources of calcium for individuals who cannot consume dairy products.	True	254	58.7
	False	31	7.2
	I don't know	148	34.2
15. Taking calcium supplements by itself can help prevent bone loss.	True	114	26.3
	False	219	50.6
	I don't know	100	23.1

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16. Consuming alcohol in moderation has little impact on osteoporosis.	True	117	27.0
	False	163	37.6
	I don't know	153	35.3
17. High salt intake increases the risk of developing osteoporosis.	True	167	38.6
	False	61	14.1
	I don't know	205	47.3
18. There is a slight decrease in bone density during the first 10 years after the onset of menopause.	True	226	52.2
	False	68	15.7
	I don't know	139	32.1
19. After menopause, hormone therapy can prevent further bone loss at any age.	True	190	43.9
	False	37	8.5
	I don't know	206	47.6
20. There are currently no effective treatments for osteoporosis available in Saudi Arabia.	True	72	16.6
	False	222	51.3
	I don't know	139	32.1

As shown in figure (2), analysis of the data supplied regarding perceptions of hormone therapy after menopause provides significant insight. 190 of the total sample of 433 respondents, or about 43.9 percent, furtively assert that hormone therapy can prevent further bone loss at any age after menopause. In contrast, only 37 respondents, or about 8.5 percent, said they believed this statement was false. Notably, a substantial portion, comprising 206 participants or around 47.6%, indicated uncertainty, selecting "I don't know."

Figure (2): Illustrates effect of hormone therapy on bone loss after menopause among participants.

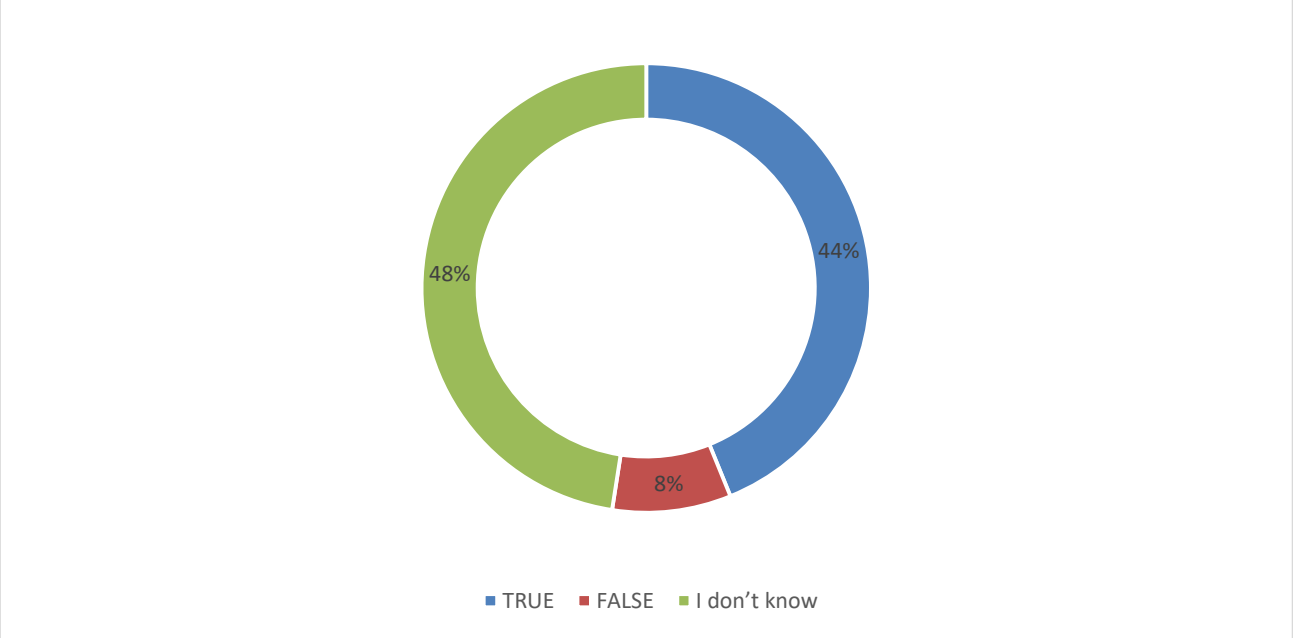

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Table 3 reveals a concerning lack of knowledge, with only 1.8% of participants demonstrating a high level of awareness. A greater proportion, 35.8%, exhibited moderate knowledge, while a significant 62.4% had low knowledge regarding osteoporosis risk factors.

Table (3): Shows knowledge level of osteoporosis risk factors score results.

	Frequency	**Percent**
High level of knowledge	8	1.8
Moderate knowledge	155	35.8
Low knowledge level	270	62.4
Total	433	100.0

Table (4) shows that knowledge level of osteoporosis risk factors has statistically significant relation to age (P value=0.011), occupational status (P value=0.002) and source of knowledge (P value=0.0001). It also shows statistically insignificant relation to marital status, monthly income, living place, educational level, and residential region. Participants aged between 23 and 32, students or employee in health sector and those who received their knowledge from physicians were found to have higher knowledge level regarding osteoporosis risk factors than others.

Table (4): Relation between knowledge level of osteoporosis risk factors and sociodemographic characteristics.

Parameters		***Knowledge level***		***Total (N=433)***	***P value****
		High or moderate knowledge	***Low knowledge level***		
Age	22 or less	38	72	110	0.011
		23.3%	26.7%	25.4%	
	23 to 32	50	51	101	
		30.7%	18.9%	23.3%	
	33 to 45	46	71	117	
		28.2%	26.3%	27.0%	
	46 or more	29	76	105	
		17.8%	28.1%	24.2%	
Marital status	Single	77	107	184	0.230
		47.2%	39.6%	42.5%	
	Married	77	136	213	
		47.2%	50.4%	49.2%	
	Divorced	4	15	19	
		2.5%	5.6%	4.4%	

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	Widowed	5	12	17	
		3.1%	4.4%	3.9%	
Monthly income	Less than 5000	63	95	158	0.774
		38.7%	35.2%	36.5%	
	5000 to 10000	39	60	99	
		23.9%	22.2%	22.9%	
	10000 to 15000	20	35	55	
		12.3%	13.0%	12.7%	
	More than 15000	23	39	62	
		14.1%	14.4%	14.3%	
	I don't know	18	41	59	
		11.0%	15.2%	13.6%	
Living place	Rented Apartment	42	45	87	0.177
		25.8%	16.7%	20.1%	
	Own Apartment	27	49	76	
		16.6%	18.1%	17.6%	
	Rented villa	8	17	25	
		4.9%	6.3%	5.8%	
	Own Villa	76	133	209	
		46.6%	49.3%	48.3%	
	Other	10	26	36	
		6.1%	9.6%	8.3%	
Educational level	Primary school	2	2	4	0.151
		1.2%	0.7%	0.9%	
	Middle school	2	10	12	
		1.2%	3.7%	2.8%	
	High school	22	59	81	
		13.5%	21.9%	18.7%	
	Diploma	15	22	37	
		9.2%	8.1%	8.5%	
	Bachelor's degree	104	159	263	
		63.8%	58.9%	60.7%	
	Postgraduate degree	16	15	31	
		9.8%	5.6%	7.2%	
	Uneducated	2	3	5	
		1.2%	1.1%	1.2%	
Occupational status	Student	25	64	89	0.002
		15.3%	23.7%	20.6%	

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	Student in health major	29	20	49	
		17.8%	7.4%	11.3%	
	Employee in health sector	17	12	29	
		10.4%	4.4%	6.7%	
	Employee in non-health sector	33	52	85	
		20.2%	19.3%	19.6%	
	Freelance	8	13	21	
		4.9%	4.8%	4.8%	
	Unemployed	36	77	113	
		22.1%	28.5%	26.1%	
	Retired	15	32	47	
		9.2%	11.9%	10.9%	
Residential region	Northern region	8	13	21	0.421
		4.9%	4.8%	4.8%	
	Southern region	44	59	103	
		27.0%	21.9%	23.8%	
	Central region	42	89	131	
		25.8%	33.0%	30.3%	
	Eastern region	31	57	88	
		19.0%	21.1%	20.3%	
	Western region	38	52	90	
		23.3%	19.3%	20.8%	
Source of knowledge	Social media	54	121	175	0.0001
		33.1%	44.8%	40.4%	
	Physician	53	38	91	
		32.5%	14.1%	21.0%	
	Friends	5	17	22	
		3.1%	6.3%	5.1%	
	Relatives	24	47	71	
		14.7%	17.4%	16.4%	
	Patients	9	10	19	
		5.5%	3.7%	4.4%	
	Other	18	37	55	
		11.0%	13.7%	12.7%	

P value was considered significant if ≤ 0.05.

Discussion:

In order to evaluate the knowledge and awareness levels over osteoporosis risk factors, the present study analyzed the level of knowledge and awareness of Saudi women—the demographic that is most affected

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by this condition. Osteoporosis is often referred to as a silent disease, it is a serious public health challenge for all women but particularly so among those at greater risk – such as from changes in hormones following menopause, inadequate diet, or lifestyle factors. The findings of this study revealed a concerning trend: Low levels of awareness about osteoporosis risk factors were shown by a significant majority of participants (1.8% being a high level of awareness). This also complements previous research that suggests that osteoporosis knowledge is lacking among people from numerous other populations, including women of different regions and age groups.

For example, a low knowledge score of 47.3% was reported in a cross-sectional study done in Lebanon similarly reporting the association of awareness with educational level and physical activity [11]. Similarly, a Swiss study showed that many risk factors were identified, but with respect to patients there was still much knowledge gap regarding the chronic nature of osteoporosis [12]. This implies that although people might be aware there is a disease, they have no clear understanding about risk factors and outcomes, as we found that a significant number were not aware that physical activity and hormone therapy were important in preventing osteoporosis.

The demographic profile of our participants revealed that a considerable number were educated, with 60.7% holding bachelor's degrees. Nevertheless, having this amount of education did not result in higher awareness scores of osteoporosis. Such a picture is consistent with findings of a study in India [13] of knowledge of osteoporosis among urban adults varying in educational backgrounds. A recent study of postmenopausal women in India reported that 20% of women had good knowledge of osteoporosis and that targeted educational interventions are needed [14]. It suggests that education, alone, only guarantees knowledge of health issues to some extent, and much more discerning topics too, such as osteoporosis.

In addition, we found strong links between knowledge of osteoporosis risk factors and age and occupational status. Awareness was highest in participants 23 to 32 of age and in those working in the health sector, which is consistent with previous work from work from Palestine that found that increased education level was associated with increased levels of awareness of osteoporosis [15]. Since targeted educational programs, especially for young women and those in health professions, may enhance knowledge and awareness of osteoporosis risk factors, this suggests.

Interestingly, a large majority of the participants recognized that osteoporosis may cause a fracture but surprisingly there was low understanding about any risk factors. For example, just 27.5 percent saw the value in physical activity for prevention, which is a known preventive measure for osteoporosis [16]. This is concerning as the knowledge of osteoporosis is there, but not the prevention that a treatment entails. An analysis of a similar study in Singapore found among participants reported that 88.3% reported low awareness scores on osteoporosis, with the scores particularly lower for older women with less education [17]. This demonstrates a widely reported common pattern that educational interventions are necessary to fill these knowledge gaps.

Other limitations of the present study need also to be noted. Although cross sectional design is useful for assessing the knowledge level at a given point in time, it does not permit to establish causal relationships. Further, self-reported data may be biased as participants may overstate their knowledge or awareness of osteoporosis.

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Conclusion:
Thus, this study has important implications of finding that Saudi women need to have improved awareness and knowledge of osteoporosis risk factors through improved educational initiatives. Although participant group possessed a high level of education, low awareness scores indicate that educational attainment alone does not necessarily result in knowledge of health issues. Future research should attend to the development of knowledge targeted interventions directed against the fundamental knowledge gaps identified in this study, especially regarding the link between lifestyle choices, medical treatments, and osteoporosis prevention. We empower women to manage their bone health by better understanding osteoporosis, paving the way for better osteoporosis education, allowing fewer fractures due to an increasingly prevalent condition.

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Ethical approval:
After fully explaining the study and emphasizing that participation is optional, each participant gave their informed consent. The information gathered was safely stored and utilized exclusively for study.

Funding:
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Conflict of interests:
The authors declare no conflict of interest.

Informed consent:
Written informed consent was acquired from each individual study participant.

Data and materials availability:
All data associated with this study are present in the paper.

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