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Osteoporosis knowledge, attitudes, and practices among women in Makkah, Saudi Arabia

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ABSTRACT

Introduction: Osteoporosis is a systemic disease that is characterized by a decline in the mass of bone leading to bone thinning and fragility that, in turn, leaves patients highly vulnerable to bone fractures. There is a lack of information on awareness about osteoporosis in Makkah, the third most populated city in Saudi Arabia. *Aims:* To investigate the level of attitude, practice and knowledge of females in Makkah regarding osteoporosis. *Methods:* A cross-sectional descriptive study was carried out among females in Makkah, Saudi Arabia from October 1 to 31, 2021. The study queried Saudi and non-Saudi adult women residing in Makkah through a self-administered, previously validated questionnaire that was distributed online in addition to a tool used to assess the knowledge regarding osteoporosis. *Results:* Of 404 females (mean age 27.4 ± 10.1 years) participated. The proportions of participants who exhibited high levels of perception were 56%, 87.9%, and 56.9%, respectively. There were significant associations between attitudes and knowledge (P = 0.025) and practices (P = 0.003). Furthermore, attitude level was associated with education level (P = 0.047). *Conclusion:* An acceptable amount of women showed high levels 1of practice and perception, whereas their attitude was much higher regarding osteoporosis. This high attitude suggests that the female participants are willing to increase their knowledge and practice, both of which can be achieved by increasing education through university education and physicians.

Key Words: Osteoporosis, Knowledge, Attitude, Postmenopausal, Saudi Arabia.

1. INTRODUCTION

Osteoporosis is the most prevalent disease and a "silent" yet growing public health concern worldwide (Khired et al., 2021). This systemic disease is characterized by a decline in bone mass and the deterioration of the bone mass structure leading to bone thinning and fragility that renders patients highly

vulnerable to fractures (Whitfield et al., 2013, Osman et al., 2013). Since it is an asymptomatic disease, it often goes unnoticed until the affected individual breaks a bone, at which point it becomes evident (Cosman et al., 2014). Osteoporosis dramatically affects patients' quality of life (Kanis et al., 2008; Hassan et al., 2021). Osteoporosis is divided into two types; Primary osteoporosis includes types one and two. Primary osteoporosis is among females after menopause, whereas type two, which is senile osteoporosis, occurs in older age, with a female to a male ratio of 2:1. Secondary osteoporosis is related to certain diseases and specific medications (Kim et al., 2007). Osteoporosis is responsible for more than eight million fractures and accounts for 2.8 million disability-adjusted life-years worldwide (Hernlund et al., 2013). People with osteoporosis are over 200 million individuals globally (Tomishige-Mukai et al., 2016). The frequency of osteoporosis among postmenopausal Saudi women is almost 31-40% (Mahboub et al., 2014). The osteoporosis prevalence among Saudi women is 67% (Sato et al., 2006). The osteoporosis risk factors include female sex, advanced age, menopause, decreased sex hormone levels, smoking, and vitamin D deficiency (Saeedi et al., 2014, Alonge et al., 2017). AlHarthi et al. (2017) conducted a survey of Saudi women in Riyadh to evaluate their perceptions about osteoporosis. The ages ranged from 21 to 40 years old. Overall, they possessed a strong understanding of osteoporosis. However, another Saudi study conducted on 250 female students in Princess Nourah University in Riyadh found perception of the subjects was inadequate towards osteoporosis risk factors. Moreover, the students' practices were poor, with only a tiny proportion of students reporting engaging in physical activities and consuming sufficient dairy products (Khired et al., 2021). In the Asser regions, women aged 15-56 years and older were included in a study performed by Osman. The study revealed that women's attitudes, practices, and knowledge were inadequate regarding osteoporosis (Osman et al., 2013). In contrast, a survey from Al Majma'ah City on 18 years and older females found adequate knowledge among participants regarding osteoporosis. Females aged 18-25 years old and homemakers exhibited higher and better knowledge levels than those aged 25-65 and employed women (ElTohami et al., 2015). Studies outside Saudi Arabia reported similar results. A study from Pakistan conducted on female medical students reported insufficient knowledge of osteoporosis (Bilal et al., 2017). Iranian women also showed insufficient knowledge in addition to negative attitudes toward and weak implementation of osteoporosis prevention measures (Jalili et al., 2007). A study involving Malaysian health sciences students revealed moderate to fair knowledge and attitudes as well as poor practices among this population. Of note, the study year and age of the students' inversely affected their practices (Ramli et al., 2018). In Makkah, there is a shortage of data regarding awareness of osteoporosis, the third most populated city in Saudi Arabia. This study's purpose is to address levels of perceptions, practices, and attitudes of females in Makkah regarding osteoporosis.

2. METHODS

The study design was cross-sectional, and conducted in October 2021 included adult women in Makkah city, Saudi Arabia. A previously validated, pre-coded, electronic, Arabic questionnaire, self-administered was utilized to generate data (Khired et al., 2021). An obtained informed consent before participants involved in this study. The questionnaire was published and distributed online through social media platforms. The study included Saudi and non-Saudi females currently residing in Makkah city, 18 above, who agreed to contribute in this research. The least sample size needed to achieve a confidence interval of 95% was 385 participants. A convenient sample size and convenience sampling technique were utilized. The participants' understanding of osteoporosis was examined as was the specialist who the women visited to treat osteoporosis. Also, the administration of vitamin D was determined in addition to their Knowledge osteoporosis, their exposure to sunlight, their attendance of awareness campaigns. The questionnaire included four sections: demographics, knowledge (15 questions), attitudes (11 questions), and practices (9 questions) regarding osteoporosis. An additional question was added to investigate the source of the participants' knowledge. The items included in the questionnaire were adapted from the validated OKAT questionnaire which stands for Osteoporosis-Knowledge-Assessment Tool. The questionnaire was translated into Arabic from English and back-translated to maintain its precision (Khired et al., 2021). The responses to the 15 knowledge questions were either true, false, or unknown. The overall grade for knowledge was ranged between 0 and 17; poor knowledge was considered as 0 to 8 while a score between 9 and 17 was reflective of good knowledge. The responses to the 11 attitude questions were depending on a 3-point Likert scale (agree [score = 3], uncertain [score = 2], disagree [score = 1]); therefore, the maximum total attitude score was 24. The final attitude scores were broken down into: perceived seriousness score 1–3 (one item); perceived severity 2–6 (two items); perceived susceptibility 1–3 (one item); perceived risk factors 2–6 (two items); and risk factors 2–6 (two items). The 9 practice questions were scored using the following rating system: 1 point for never, 2 points for seldom, 3 points for 1–3 times/week, 4 points for often, and 5 points for daily. The maximum total score was 13, and a higher score was indicative of better preventive behaviors (Khired et al., 2021).

Statistical Analyses

Data were entered into Microsoft Excel 2019 and SSPS version 21 (IMB; Armonk, NY, USA) , the data was analyzed using SPSS version 21. To represent qualitative and quantitative data. A score over 60% was considered good and under 60% was considered poor. To compare the percentage, a chi-squared test was utilized. The score averages for the different categories were compared using a t-test. A statistically significant P-value was less than 0.05.

Ethical Considerations

Umm Al-Qura University's Biomedical Research Ethics Committee approved the study (project number HAPO-02-K-012-2021-09-757 on 13/9/2021). Participants provided their written informed consent before to data collection and after they obtained clear and comprehensive information about the aim and benefits of the study. All the Participants were informed that their contributions to the study were anonymous and voluntary, provided was confidential.

3. RESULTS

Of 404 Saudi women who responded to the online self-administered questionnaire. The age of the subjects was 27.4 ± 10.1 years, and approximately half of the subjects (n = 273, 67.6%) had bachelor's degrees (Table 1).

Table 1: Participant demographics

		n	%
Age (mean ± SD)		27.4 ± 10.1	n/a
Education level	Secondary	118	29.2%
	Bachelor's degree	273	67.6%
	Master's degree	8	2.0%
	PhD	5	1.2%

The knowledge of females was investigated through 16 questions with three answers options (Table 2). The attitudes of the female participants were investigated through 15 questions; the details of the questions and answers concerning the participants' attitudes are presented in Table 3. The 9 questions and corresponding answers investigating their practices demonstrated in the Table 4.

Table 2: Responses to osteoporosis knowledge questionnaire section

		Count	Column N %
Osteoporosis is more prevalent among females	False	22	5.4%
	Right	316	78.2%
	I don't Know	66	16.3%
Osteoporosis increases the risk for fractures	False	10	2.5%
	Right	382	94.6%
	I don't Know	12	3.0%
Osteoporosis is more prevalent among elders	False	33	8.2%
	Right	355	87.9%
	I don't Know	16	4.0%
A sedentary lifestyle increases the chance of getting osteoporosis	False	30	7.4%
	Right	289	71.5%
	I don't Know	85	21.0%
Asians are more commonly affected with osteoporosis	False	81	20.0%
	Right	60	14.9%
	I don't Know	263	65.1%

Smoking can cause osteoporosis	False	40	9.9%
	Right	211	52.2%
	I don't Know	153	37.9%
Most people gain their bone mass at 30 years	False	108	26.7%
	Right	89	22.0%
	I don't Know	207	51.2%
Walking improves bone health	False	44	10.9%
	Right	328	81.2%
	I don't Know	32	7.9%
Diagnosis of osteoporosis is depend on bone mineral density test	False	13	3.2%
	Right	167	41.3%
	I don't Know	224	55.4%
A most important time to build bones at 17 years old	False	133	32.9%
	Right	108	26.7%
	I don't Know	163	40.3%
Osteoporosis can lead to blindness	False	222	55.0%
	Right	28	6.9%
	I don't Know	154	38.1%
Taking vitamin D and calcium for life long don't protect against osteoporosis	False	208	51.5%
	Right	107	26.5%
	I don't Know	89	22.0%
Obese adults are at risk for osteoporosis	False	303	75.0%
	Right	46	11.4%
	I don't Know	55	13.6%
Hormone replacement therapy hinder osteoporosis	False	100	24.8%
	Right	65	16.1%
	I don't Know	239	59.2%
Osteoporosis is also known as osteoarthritis	False	54	13.4%
	Right	100	24.8%
	I don't Know	250	61.9%
Do you think that awareness campaigns will improve the understanding about osteoporosis in women?	False	9	2.2%
	Right	364	90.1%
	I don't Know	31	7.7%

Table 3: Responses to osteoporosis attitude questionnaire section.

		Count	Column N %
I have a big chance of developing osteoporosis	Strongly disagree	73	18.1%
	Disagree	78	19.3%
	Neutral	130	32.2%
	Agree	104	25.7%
	Strongly agree	19	4.7%
If my parents had osteoporosis, I most probably would have it too	Strongly disagree	73	18.1%
	Disagree	121	30.0%
	Neutral	119	29.5%
	Agree	74	18.3%

	Strongly agree	17	4.2%
I will go voluntarily to check up for osteoporosis	Strongly disagree	14	3.5%
	Disagree	41	10.1%
	Neutral	88	21.8%
	Agree	175	43.3%
	Strongly agree	86	21.3%
I will go to an endocrinologist to manage osteoporosis	Strongly disagree	34	8.4%
	Disagree	77	19.1%
	Neutral	110	27.2%
	Agree	139	34.4%
	Strongly agree	44	10.9%
I will go to orthopedics to prevent fractures	Strongly disagree	21	5.2%
	Disagree	43	10.6%
	Neutral	102	25.2%
	Agree	178	44.1%
	Strongly agree	60	14.9%
I will go to orthopedics to manage osteoporosis	Strongly disagree	13	3.2%
	Disagree	21	5.2%
	Neutral	52	12.9%
	Agree	181	44.8%
	Strongly agree	137	33.9%
Fracture neck femur and vertebral fractures are the commonest fractures associated with osteoporosis	Strongly disagree	13	3.2%
	Disagree	44	10.9%
	Neutral	137	33.9%
	Agree	155	38.4%
	Strongly agree	55	13.6%
I'm afraid of having osteoporosis	Strongly disagree	19	4.7%
	Disagree	32	7.9%
	Neutral	67	16.6%
	Agree	170	42.1%
	Strongly agree	116	28.7%
If I got osteoporosis, I might have paralysis	Strongly disagree	98	24.3%
	Disagree	142	35.1%
	Neutral	109	27.0%
	Agree	41	10.1%
	Strongly agree	14	3.5%
I think vitamin D is useful for my healthy bones	Strongly disagree	9	2.2%
	Disagree	15	3.7%
	Neutral	48	11.9%
	Agree	188	46.5%
	Strongly agree	144	35.6%
Vitamin D is used in the treatment of osteoporosis	Strongly disagree	9	2.2%
	Disagree	17	4.2%
	Neutral	83	20.5%
	Agree	183	45.3%

	Strongly agree	112	27.7%
A healthy diet can prevent osteoporosis	Strongly disagree	7	1.7%
	Disagree	16	4.0%
	Neutral	24	5.9%
	Agree	161	39.9%
	Strongly agree	196	48.5%
I feel worried when I think about osteoporosis	Strongly disagree	51	12.6%
	Disagree	67	16.6%
	Neutral	127	31.4%
	Agree	126	31.2%
	Strongly agree	33	8.2%
I can practice sports three times weekly	Strongly disagree	14	3.5%
	Disagree	23	5.7%
	Neutral	73	18.1%
	Agree	180	44.6%
	Strongly agree	114	28.2%
I can practice sport for 20 minutes	Strongly disagree	7	1.7%
	Disagree	18	4.5%
	Neutral	59	14.6%
	Agree	165	40.8%
	Strongly agree	155	38.4%

Table 4: Responses to the osteoporosis practice questionnaire section.

		Count	Column N %
Do you eat vegetables as a part of your diet?	Never	14	3.5%
	Sometimes	101	25.0%
	Often	203	50.2%
	Everyday	86	21.3%
Do you take fruits as a part of your daily diet?	Never	16	4.0%
	Sometimes	175	43.3%
	Often	163	40.3%
	Everyday	50	12.4%
Do you take a vitamin D supplement?	Never	148	36.6%
	Sometimes	124	30.7%
	Often	86	21.3%
	Everyday	46	11.4%

Do you drink milk?	Never	51	12.6%
	Sometimes	141	34.9%
	Often	129	31.9%
	Everyday	83	20.5%
Do you eat a balanced diet?	Never	88	21.8%
	Sometimes	150	37.1%
	Often	125	30.9%
	Everyday	41	10.1%
Do you smoke?	Never	344	85.1%
	Sometimes	27	6.7%
	Often	13	3.2%
	Everyday	20	5.0%
Do you consume alcohol?	Never	379	93.8%
	Sometimes	5	1.2%
	Often	9	2.2%
	Everyday	11	2.7%
Do you spend more than 15 minutes on Sun?	Never	124	30.7%
	Sometimes	148	36.6%
	Often	86	21.3%
	Everyday	46	11.4%
Do you practice physical activity >20 minutes daily?	Never	75	18.6%
	Sometimes	139	34.4%
	Often	142	35.1%
	Everyday	48	11.9%

The total levels of attitude, knowledge and practice were estimated; 177 (56%), 355 (87.9%), and 230 (56.9%) participants had high levels respectively (Table 5, Figure 1).

Table 5: Attitude, knowledge, and practice of osteoporosis.

		Count	Column N %
Knowledge	Low knowledge	139	44.0%
	High knowledge	177	56.0%
Attitude	Low score	49	12.1%
	High score	355	87.9%
Practice	Low score	174	43.1%
	High score	230	56.9%

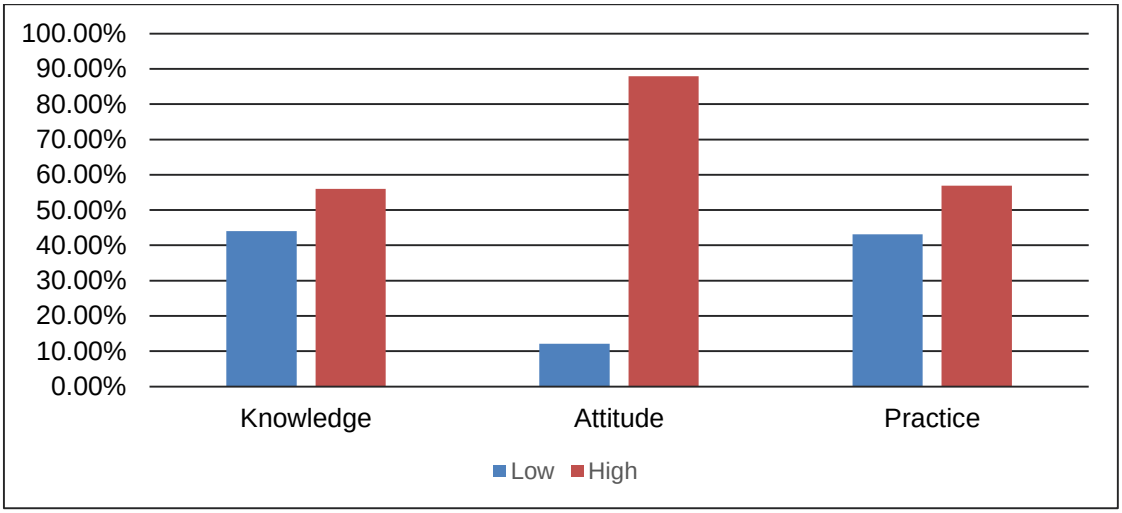

Figure 1: Bar chart showing attitude, knowledge, and practice of osteoporosis among included females.

The factors that correlated with knowledge level are presented in Table 6. There was no association found 5 between the participants level of perception and other age (P = 0.6) or education level (P = 0.32), whereas significant association were found between attitude (P = 0.025) and practice (P = 0.003) (Figure 2).

Table 6: Comparison of demographics based on level of knowledge.

		Knowledge				P-value
		Low knowledge		High Knowledge		
		Count	Column N %	Count	Column N %	
Age		26.3	8.4	27.4	10.2	0.60
Education level	Secondary	38	27.3%	52	29.4%	0.32
	Bachelor's degree	99	71.2%	117	66.1%	
	Master's degree	2	1.4%	5	2.8%	
	Ph.D. degree	0	0.0%	3	1.7%	
Attitude	Low score	11	7.9%	29	16.4%	0.025

	High score	128	92.1%	148	83.6%	
Practice	Low score	71	51.1%	61	34.5%	0.003
	High score	68	48.9%	116	65.5%	

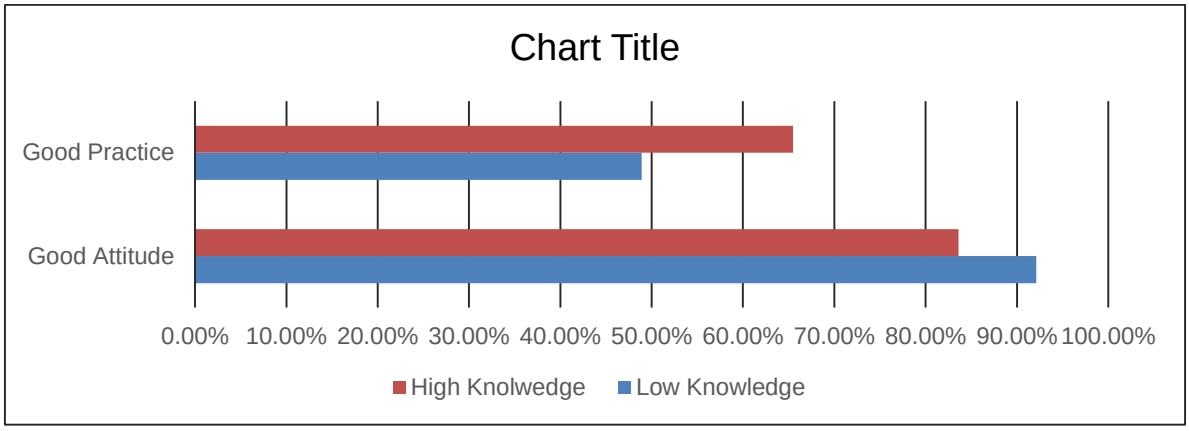

Figure 1: Bar chart viewing the association between knowledge level, attitude, and practice.

The correlations with attitude are presented in Table 7; age and practice no significant correlation with attitude (P = 0.35) and (P = 0.2), respectively, whereas education correlated significantly (P = 0.047) (Figure 3).

Table 7: Comparison of demographics based on attitude.

		Attitude				
		Low score		High score		
		Count	Column N %	Count	Column N %	P-value
Age		27.6	13.1	27.4	9.7	0.35
Education level	Secondary	20	40.8%	98	27.6%	0.047
	Bachelor's degree	26	53.1%	247	69.6%	
	Master's degree	1	2.0%	7	2.0%	
	Ph.D. degree	2	4.1%	3	0.8%	
Practice	Low score	17	34.7%	157	44.2%	0.20
	High score	32	65.3%	198	55.8%	

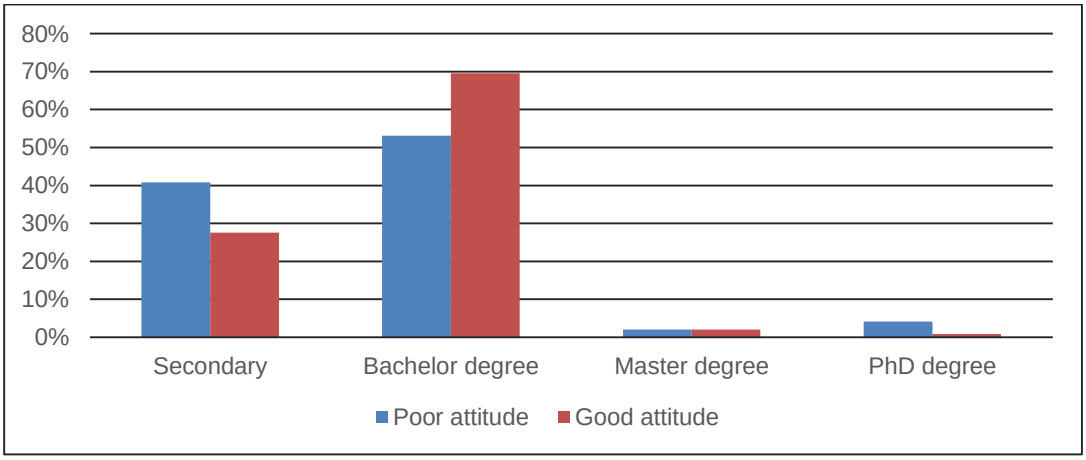

Figure 3: Bar chart showing the correlation between attitude towards osteoporosis and education level.

Regarding practice, there was no factor found to affect neither age (P = 0.42) nor education level (P = 0.64; Table 8).

Table 8: Comparison of demographics based on level of practice.

		Practice				P-value
		Low score		High score		
		Count	Column N %	Count	Column N %	
Age		27.9	10.3	27.1	10.0	0.42
Education level	Secondary	51	29.3%	67	29.1%	0.64
	Bachelor's degree	118	67.8%	155	67.4%	
	Master's degree	2	1.1%	6	2.6%	
	Ph.D. degree	3	1.7%	2	0.9%	

The comparison between the knowledge and the other two aspects investigated showed that it is affected by a factor of attitude (P = 0.025) and the practice level (P = 0.003; Table 9).

Table 9: Comparison of knowledge levels based on practice and attitude scores.

		Knowledge				P-value
		Low		High		
		Count	Row N %	Count	Row N %	
Attitude	Low	11	27.5%	29	72.5%	0.025
	High	128	46.4%	148	53.6%	
Practice	Low	71	53.8%	61	46.2%	0.003
	High	68	37.0%	116	63.0%	

4. DISCUSSION

Females are more predisposed to osteoporosis than males at a ratio of 4:1(Alswat et al., 2017). Most young, healthy females by the age of 26 years old have 99% of their body minerals (Nachtigall et al., 2013). Comprehend the awareness of a person's young females to prevent the of osteoporosis development. Moreover, the knowledge of individuals on health-related issues has a considerable effect on their health and lifestyle (Khired et al., 2021). Increasing the awareness from an early age and modification of individuals 'attitudes contribute to the osteoporosis prevention (Nachtigall et al., 2013); for these reasons, This study demonstrated that more than one-half of females had high knowledge and practice, whereas the attitude of majority was positive. The determining factors of each investigated aspect were assessed. Concerning osteoporosis knowledge, both age and education level were not associated with persons' knowledge, whereas attitude and practice significantly correlated to the knowledge level. Females with low knowledge levels tended to show higher attitudes, which seems indicative of a willingness to increase their knowledge; this is reinforced by the large majority of our participants reporting that awareness campaigns would improve their knowledge. Also, participants with low knowledge scores were more prone to exhibit low practice scores. The lack of practicing prevention measures reflects the importance of osteoporosis disease perception in the protection against osteoporosis. When women have adequate knowledge, their practice of prevention measures is high, rendering them had a less likelihood for osteoporosis to occur. The current study's female participants' attitudes were significantly influenced by their educational level,

whereas age and practice weren't associated with attitude. No associated factor was found with the practice; the collected demographics of participants had no impact on practice. One study from Saudi Arabia conducted on females of Princess Norah University showed that the perception was worse than our findings, where only 16% of females showed a good score of knowledge. The study didn't report the factors affecting perception; instead, the only association reported was the link between scores levels and source of knowledge. Another variation between the two conducted studies is that we included the overall practice and attitude as well of students. This revealed that only a small proportion of women, either juniors or seniors, reported consuming sufficient dietary products, and even less were engaged in physical exercise (Khired et al., 2021). Diet can help with osteoporosis prevention; also, physical activity increases muscle mass, which eventually increases bone strength (Hernandez et al., 2014). In our study a high proportion of participants reported consuming a balanced diet, and higher proportions also reported being engaged in physical activity. Thus, our study yielded more encouraging findings than the previous Saudi study (Khired et al., 2021), in addition to providing more detailed information regarding the determinants of KAP. Another Saudi study conducted on university students but included both sexes and showed that the large majority (92%) of students were somewhat aware of osteoporosis. The level of knowledge among participants was good, with greater knowledge bring noted among females (Khan et al., 2019). A study from Riyadh conducted on females aged 21 years and older found higher levels of perception significantly associated with younger age and good educational levels (AlHarthi et al., 2017). On the contrary, we found that age and education level had no impact among our participants on the knowledge levels. A conducted study on women attending a healthcare center in the Assir region 1demonstrated an unsatisfactory level of KAP among females and, therefore, additional health education is warranted in this region (Osman et al., 2013), whereas our study showed more encouraging results. A study from Majma'ah City conducted on adult females aged 18 years and older reported findings contrary to those described here. They reported that fair to good knowledge among about half of the recruited women, and the vast majority among this population had good attitudes and practices as well. Age had a remarkable influence on the level of knowledge (ElTohami et al., 2015). In this conducted study, we found age had no influence on KAP levels. The level of perception was higher among university female students from Jeddah towards osteoporosis, as 77% of participating females reported high knowledge (Zakai et al., 2015), which was better than ours. The low knowledge among females regarding osteoporosis isn't limited to the female students or women 3in the public; female medical students from Pakistan also showed insufficient perception additionally to the shortage of preventative practices (Bilal et al., 2017).

5. CONCLUSION

Acceptable proportions of females showed high knowledge and practice; however, knowledge and practice require more improvements. The attitude of females was much higher regarding osteoporosis; this high attitude among participants is promising and reflects that females are willing to increase their knowledge and practice. Therefore, establishing techniques to help them learn more and encourage preventative practices can be very effective. The establishment of further studies after the implementation of such strategies will show the effectiveness of such strategies for osteoporosis prevention, early identification, and effective treatment.

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Author Contributions

GA[1] and MB are responsible for the study research conception and design concept, BA and YA for Data acquisition, RF and RQ for Drafting of the manuscript, Critical revision of the manuscript, Administrative, technical, or material support and Approval of the final manuscript.

NA, MA[2] and LA were responsible for the Statistical analysis, Data analysis and interpretation and Supervision.

Ethical approval

The study was approved by the Medical Ethics Committee of Umm Alqura University (ethical approval code: HAPO-02-K-012-2021-09-757).

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Conflict of interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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