

Assessment of Osteoporosis Knowledge, Health Beliefs and Self-efficacy in Premenopausal Women in the Kingdom of Bahrain

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ABSTRACT

This study aimed to measure the current osteoporosis knowledge, health beliefs, self-efficacy, preventive measures among premenopausal women in Bahrain. A questionnaire was administered to 400 premenopausal women aged 20 to 49 attending outpatient clinics at primary health care centres. There was a high osteoporosis health belief scale score regarding the benefit of exercise, calcium intake, and health motivation, but a low health belief in osteoporosis perceived severity and susceptibility. The osteoporosis self-efficacy scale mean was 78.73, lower than the cut-off point (85.8), which showed encouraging moderate responses. The Pearson correlation coefficient showed a statistically significant positive correlation between OKAT and OHBS-Susceptibility and between OHBS-subcales and OSES-self-efficacy exercise. Many premenopausal women lacked knowledge and had low health beliefs about osteoporosis seriousness and susceptibility. Efforts should be made to raise osteoporosis awareness among premenopausal women through health education intervention programs for both pre and postmenopausal age groups.

Keywords: Osteoporosis, Health belief, Knowledge, Self-efficacy, Premenopausal

INTRODUCTION

Osteoporosis is a public health problem in postmenopausal women; it starts early in premenopausal women. It is a systemic skeletal disorder that worsens women's quality of life (QoL)^{1,2}. Although osteoporosis is a prevalent metabolic skeletal disease, it is a silent progressive disease. Osteoporosis is a progressive decline in bone mass density (BMD), decreased bone microarchitecture strength, and increased bone fragility rate, which leads to increased future bone fractures³. Later symptoms include backache (e.g., fractured or collapsed vertebra), loss of height (convex posture), and a history of unexplained fractures even after trivial trauma^{4,6}. Currently, osteoporosis is among the top five conditions causing disability and prolonged stay in the hospital among geriatric people^{7,8}.

The direct and indirect costs of managing osteoporosis with fragility fractures are increasing rapidly worldwide. For example, the annual fees in the USA are expected to increase by 50% to \$25 billion by

2025⁸. In Europe, the annual costs of managing osteoporosis were €31.7 billion and are expected to increase by 142% to €76.7 billion in 2050. Saudi Arabia's annual cost of treating osteoporosis fractures was 2.359 billion Saudi Riyals⁸. In Bahrain, the total yearly cost was 5.310 million Bahraini Dinars (US\$14.07 million)^{8,9}.

The incidence of global osteoporosis is 200 million, with >8.9 million osteoporotic fractures occurring annually^{1,2}. However, greater than 50% of all future osteoporotic fractures will occur in Asia due to lower bone mass density (BMD)¹⁰⁻¹². The prevalence of osteoporosis in Middle Eastern countries was 28.56%, with Bahrain ranking first with the highest prevalent, 38.5%⁸. Such high rates may be explained by marginally increasing ageing groups from 2.14% (2011) to 2.89% (2021), in addition to vitamin-D insufficiency and deficiency reaching 87% of the adult Bahraini population¹³. Therefore, the WHO has recognized osteoporosis as one of the healthcare priorities in the Middle East region, targeting to increase alertness and training programs regarding osteoporosis among women¹⁴.

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The predisposing factors for osteoporosis are genetic (75%) and environmental risk factors (25%). Environmental risk factors include middle age menopausal women with a history of smoking tobacco, alcohol consumption, sedentary life, and low calcium and vitamin D intake¹⁵. In addition, the predisposing factors will rapidly shrink BMD at early menopausal age¹⁶. Thus, the importance of preserving BMD in the early premenopausal age group by improving knowledge and adopting a healthy lifestyle in reducing late osteoporosis complications¹⁷.

OKAT are a reliable and valid instrument that found a shortage of knowledge and awareness regarding osteoporosis among females in different age groups. It showed poor application, low self-efficacy or confidence in daily exercise, and low calcium consumption, which were determined as preventative behaviors^{18,19}. Consequently, increasing awareness and knowledge of osteoporosis is essential to improve bone health among the premenopausal age group. In Bahrain, studies were scarce for osteoporosis; one study was recently published on the prevalence of osteoporosis, and another used only the OKAT instrument to assess knowledge and awareness of osteoporosis among elderly Bahraini women^{18,19}.

While OSES and OHBS have been used to address the educational needs of osteoporosis, self-efficacy and positive health beliefs are of prime importance in escalating an individual's self-confidence to cope with life difficulties and implement healthy behavioural activities^{20,21}.

Since most primary osteoporosis prevention programs have focused on the postmenopausal age group, early preventive measures are essential in the premenopausal to get the maximum benefits of healthy nutrition and practicing regular exercise can help achieve optimal peak BMD. Therefore, premenopausal must become better educated on silent, progressive disease, its predisposing factors and late complications^{9,22}.

There is a gap in research on health beliefs and self-efficacy to adopt healthy practices and undertake early preventative measures in Bahraini females. In addition, females must believe that the benefits of early disease detection, adopting healthy practices, and undertaking preventative measures of perceived benefits are more significant than the perceived barriers^{9,22}.

Significance of the Study: The prevalence of osteoporosis in older Bahraini women was 45%⁹, while the prevalence in young Bahraini women was 3.3%²². Therefore, it is crucial to understand the link between osteoporosis knowledge, osteoporosis-related beliefs, and osteoporosis preventive behaviour among the premenopausal, which will lead to evidence-based interventions that raise females' awareness about osteoporosis and to have a change in subsequent beliefs^{9,22}.

Therefore, this study aimed to investigate premenopausal knowledge, beliefs and self-efficacy concerning osteoporosis. The general objectives of the study were:

1. Assess the level of osteoporosis knowledge among premenopausal Bahraini women.
2. Assess premenopausal beliefs toward osteoporosis.
3. Assess the premenopausal self-efficacy of osteoporosis.
4. Investigate differences in premenopausal knowledge, beliefs and self-efficacy regarding osteoporosis based on their demographic data.

MATERIALS AND METHODS

Study Design and Setting: A descriptive cross-sectional design was conducted in eight health centres in Bahrain. The selected health centres covered extensive catchment areas and were open 24 hours daily.

Study Population: The study population included premenopausal Bahraini females aged 20-49 years attending primary health care centres with Arabic fluency who were willing to participate.

Sample Size and Sampling Method: Based on the Daniel and Cross (2018) formula for sample size calculation and to ensure that the sample is adequate, we assumed that the expected prevalence of osteoporosis (P) was 50% with a level of confidence of 95% and a margin of error of estimation of 5%²³. The calculated sample size was approximately 384. We rounded the final sample size to 400 and selected participants using the nonprobability convenient sampling method.

Data Collection: Data were collected using a structured questionnaire. The questionnaires were distributed from July to September 2021 in the morning and evening. The estimated time to complete questionnaires ranged from 15 to 20 minutes. This study utilized a set of instruments to quantify different variables. The first section asked about additional demographic data (age, height, weight, and level of education). Participants were also asked about various risk factors (family history of osteoporosis and fractures, inactive lifestyle, abnormal BMI (<20 or >30), high caffeine intake, low milk products, etc.)^{24,25}. The second section used different instruments, such as OKAT, OHBS, and OSES, to measure premenopausal women's knowledge, health beliefs, and self-efficacy. The validity and reliability of the surveys were studied in Arab countries, similar to Bahraini culture^{17,25-29}. The questionnaire on OKAT, OHBS, and OSES for the present study was modified and permission was obtained from a related study's publishers^{25,30}.

OKAT: We evaluated participants' osteoporosis knowledge (K) which consists of twenty questions scored with a 3-point Likert scale for Yes (1), No (0), I do not know (0), and the overall score was 0-20. The OKAT subscales comprised osteoporosis symptoms, risk factors, and availability of preventive factors and treatment. The knowledge scores were classified as follows: 0-8, poor K; 8-12, average K; and >12, good K [27-29].

OHBS: We assessed osteoporosis health beliefs, consisting of forty-two questions on a 5-point Likert scale (1=strong disagreement, 5=strong agreement), and the total score was 42-210. OHBS has seven subscales (perceived susceptibility, seriousness of osteoporosis, benefit of exercise, benefit of calcium intake, barrier to activity, barrier to calcium intake, and health motivation). Higher scores on the OHBS indicate extremely healthy beliefs. However, reverse coding (reverse scoring) was performed for the barrier subscales, and data with higher scores showed negative health beliefs^{25,31}.

OSES-s: We assessed osteoporosis self-efficacy using 12 shorter items with a modified 0-10-point Likert scale (0=not confident at all, 10=very confident), and the total score was 0-120 to make it easier for participants to complete the form. OSES assessed behavioural change regarding calcium intake and adopting exercise; each subscale ranges from 0-60. A cut-off point (85.8) and low and high OSES levels were used^{25,31}.

Statistical Analysis: The data were entered into M.S. Excel and analyzed using the Statistical Set for Social Sciences (SPSS version 28). Categorical variables were characterized as frequencies and percentages, whereas continuous variables were represented as the mean and standard deviation. Cronbach's alpha coefficient measured

the reliability of the questionnaires. We conducted an exploratory factor analysis and principal component analysis as the extraction method and varimax, respectively, and Kaiser Normalization was employed as the rotation method to evaluate construct validity. A factor was considered significant if its eigenvalue exceeded 1.0 and used the Pearson correlation coefficient to measure the relationship between the continuous variables. Also, we used the chi-square test to measure the association between the categorical variables. Statistical significance was established at $p < 0.05$ and < 0.01 .

Ethical Considerations: Ethical approval was obtained from the primary care research committee and higher institutional managers (Code Number 1572021). All participants were informed privately of the study's aim and objectives and signed a consent form. All participants completed the questionnaires without mentioning their names. The patients were guaranteed the confidentiality of the information for research purposes.

RESULTS

Reliability and Validity of the Instruments: Reliability analysis was performed for all the OKAT, OHBS, and OSES questionnaires to assess the internal consistency using Cronbach's alpha test. First, the OKAT reliability analysis for the internal consistency was 0.61, indicating acceptable internal consistency. Second, OHBS reliability analysis showed that Cronbach's alpha coefficients for Susceptibility, Seriousness, Benefits of Exercise, Benefits of Calcium Intake, Barrier Exercise, Barriers Calcium Intake, and Health Motivation were 0.74, 0.71, 0.81, 0.88, 0.77, 0.83, and 0.81, respectively. Finally, the OSES and its subscale showed excellent reliability. The Cronbach's alpha values were 0.921 for the OSE-Exercise scale and 0.929 for the OSE-Calcium scale. The OKAT, OHBS, and OSES reliabilities were 0.61, 0.842, and 0.936, respectively. Thus, these scores indicated internal consistency between good and excellent.

The construct validity of the three questionnaires, OHBS, OSES, and OKAT, was, verified using exploratory factor analysis based on the principal component method according to orthogonal rotation with the varimax way for all items. The results of the OHBS indicated that the eigenvalue for all factors (subscale) was more significant than one. The percentages of variance explained by Susceptibility, Seriousness, Benefits of Exercise, Benefits of Calcium Intake, Barrier Exercise, Barriers Calcium Intake, and Health Motivation were 17.03, 13.33, 6.02, 4.97, 4.82, 4.48, and 3.59, respectively. The cumulative variance percentage for all factors (overall) explained 54.24% of the variance. The OSES results showed that the first factor's eigenvalue (OSE-Exercise scale) was 7.090, which explained 59.09% of the total variance. The eigenvalue of the second factor (OSE-Calcium scale) was 1.77, which explained 14.720% of the total variance. The cumulative variance percentage for the two subscales was 73.81%. The OKAT generated only one factor with an eigenvalue greater than 1 (2.26), which explained 11.32% of the variance.

Description of Sample Characteristics: Four hundred and twenty participants were approached and eligible to join the study, and 400 were enrolled. The nonresponses included 20 women who refused to join the survey during the COVID-19 pandemic, and the response rate was 95.2%.

The mean age was 33.41 ± 8.33 years, and the mean BMI was 27.28 ± 5.92 kg. Most participants were married, 64.5% and 54.5% were unemployed. Half of the participants, 49.5%, were highly educated, but the employed women's salaries were less than 1000 BD (Table 1).

Table 1: Demographic characteristics of participants (N=400)

Category	Frequency (Number)	Percentage (%)
Age group		
20-29 years	160	40.0
30-39 years	140	35.0
40-49 years	100	25.0
Marital Status		
Married	258	64.5
Unmarried	142	35.5
Working Status		
Employed	182	45.5
Not employed	218	54.5
Smoking Habits		
Smoker	42	10.5
Nonsmoker	356	89.4
Level of education		
Illiterate	10	2.5
Primary/intermediate/secondary	123	30.8
Higher education	198	49.5
Postgraduate	69	17.3
Income		
Low (<1000 BD)	237	59.3
Intermediate (1000-<2000 BD)	114	28.5
Medium (2000-3000 BD)	33	8.3
High (greater than 3000 BD)	16	4.0
Age (mean \pm S.D.)	33.41 ± 8.33	
BMI (mean \pm S.D.)	27.28 ± 5.92	

Osteoporosis Risk Factors: When asked about osteoporosis risk factors (Figure 1), the most frequent risk factor was "low intake of dairy products" (57.3%, n=229), followed by "low intake of vitamin supplements" (57%, n=228) and "low exposure to the sun" (54.8%, n=219). Conversely, the least reported risk factors were "personal history of underweight" (10.8%, n=43) and "family history of nontraumatic fracture" (10.5%, n=42).

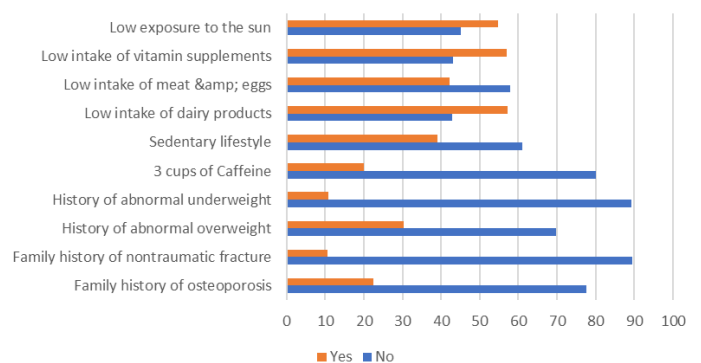


Figure 1: Different risk factors in premenopausal participants

Research Instruments: Concerning OKAT, 89.5% of women knew that osteoporosis is typically asymptomatic. Eighty-eight percent knew that osteoporosis leads to an increased risk of future bone fracture. Moreover, 22.5% believed that exercise is protective against osteoporosis. 26.5% thought that a fall was a significant risk factor for fractures. Most premenopausal women (81.1%) were unaware that a

higher peak bone mass is protective. Being old and being a smoker were not considered risk factors by 43% and 50%, respectively. Sardines, Broccoli, and Dairy products were not known to be good sources of calcium by 45% to 49% of respondents. More than half (54.8%) believe osteoporosis is more common among males than females. Only 18.3% thought that a small amount of bone loss occurred following the onset of menopause (Table 2).

Table 2: Knowledge assessment according to the number of correct responses

Item	Description	Correct Respondents	
		n	%
1	Osteoporosis leads to an increased risk of bone fractures.	355	88.8
2	Osteoporosis usually causes symptoms (e.g., pain) before fractures occur.	42	10.5
3	Having a higher peak bone mass at the end of childhood protects against osteoporosis in later life.	104	26.0
4	Osteoporosis is more common in men.	219	54.8
5	Cigarette smoking can contribute to osteoporosis.	199	49.8
6	White women are at the highest risk of fracture compared to other races.	103	25.8
7	A fall is just as important as low bone strength in causing fractures.	106	26.5
8	By age 80, the majority of women have osteoporosis.	228	57.0
9	From age 50, most women can expect at least one fracture before they die.	115	28.7
10	Any type of physical activity is beneficial for osteoporosis.	90	22.5
11	My clinical risk factors make it easy to tell whether I am at risk of osteoporosis.	145	36.3
12	A family history of osteoporosis strongly predisposes a person to osteoporosis.	249	62.3
13	An adequate calcium intake can be achieved from two glasses of milk daily.	202	50.5
14	Sardines and Broccoli are good sources of calcium for people who cannot take dairy products.	217	54.3
15	Calcium supplements alone can prevent bone loss.	175	43.8
16	Alcohol in moderation has little effect on osteoporosis.	87	21.8
17	A high salt intake is a risk factor for osteoporosis.	140	35.0
18	There is a small amount of bone loss in the decade following the onset of menopause.	73	18.3
19	Hormone therapy prevents further bone loss at any age after menopause.	80	20.0
20	There are no effective treatments for osteoporosis available in Bahrain.	154	38.5

The results showed (Table 3) no significant effect of age, marital status, smoking habit, or education status on the level of knowledge. Simultaneously, there was a significant effect of family income and working status on the level of knowledge. A good level of knowledge was found among younger, married, employed, non-smokers, higher-educated women, and low-income families.

Table 3: Association between levels of knowledge and different factors

Variables	Levels of knowledge			Total	P-value
	Poor n (%)	Moderate n (%)	Good n (%)		
Age Group					
Less than 30 years	98 (41)	45 (36.6)	17 (44.7)	160 (40)	0.458
30-40 years	84 (35.1)	41 (33.3)	15 (39.5)	140 (35)	
Greater than 40 years	57 (23.8)	37 (30.1)	6 (15.8)	100 (25)	
Total	239	123	38	400	
Marital Status					
Married	153 (64)	80 (65)	25 (65.8)	258 (64.5)	0.967
Unmarried	86 (36)	43 (35)	13 (34.2)	142 (35.5)	
Total	239	123	38	400	
Working Status					
Employed	98 (41)	59 (48)	25 (65.8)	182 (45.5)	0.014
Not employed	141 (59)	64 (52)	13 (34.2)	218 (54.5)	
Total	239	123	38	400	
Smoking Habits					
Smoker	30 (12.6)	11 (9)	1 (2.6)	42 (10.6)	0.143
Non-smoker	208 (87.4)	111 (91)	37 (97.4)	356 (89.4)	
Total	238	122	38	398	
Level of Education					
Illiterate	8 (3.3)	1 (0.8)	4 (2.6)	10 (2.5)	0.160
Primary/ Intermediate/ Secondary	81 (33.9)	36 (29.3)	6 (15.8)	123 (30.8)	
Higher education	110 (46.0)	67 (54.5)	21 (55.3)	198 (49.5)	
Postgraduate	40 (16.7)	19 (15.4)	10 (26.3)	69 (17.3)	
Total	239	123	38	400	
Income					
Low (less than 1000 BD)	156 (65.3)	64 (52)	17 (44.7)	237 (59.3)	0.040
Intermediate (1000-2000 BD)	56 (23.4)	42 (34.1)	16 (42.1)	114 (28.5)	
Medium (2000-3000 BD)	16 (6.7)	14 (11.4)	3 (7.9)	33 (8.3)	
High (greater than 3000 BD)	11 (4.6)	3 (2.4)	2 (5.3)	16 (4)	
Total	239(59.75)	123(30.75)	38(9.5)	400	

Analysis of responses to the OKAT indicates that 59.75% of respondents had poor knowledge, 30.75% had moderate knowledge, and only 9.5% had good knowledge. The mean OKAT score was 7.71 ±2.91, revealing poor knowledge (Table 4).

For the OHBS subscales, the possible score ranges from 6 to 30; a higher number indicates more optimistic subscales (Table 4). The OHBS showed low perceived osteoporosis susceptibility (16.88 ±

4.38) and low perceived osteoporosis seriousness (17.04 ± 4.33). Nonetheless, it had shown the high benefits of exercise (21.26 ± 4.48) and calcium intake (21.05 ± 4.75). The mean scores were low for perceived barriers to exercise and calcium intake, demonstrating that participants had few reported barriers to exercise or taking calcium supplements. The OHBS health motivation (21.43 ± 4.69) showed a positive (high) health motivation for health (Table 4). Also, the OSES self-efficacy exercise (38.49 ± 14.81) and self-efficacy calcium intake (40.25 ± 14.38) showed encouraging moderate responses.

The Pearson correlation coefficient showed a statistically significant positive correlation between OKAT and OHBS-Susceptibility (r = 0.110, P < 0.05). In addition, statistically significant between OHBS-subcales (e.g., OHBS-seriousness s, benefit of exercise, the benefit of calcium intake, the barrier of exercise and health motivation) and Self-efficacy exercisers (Table 5).

Negative correlation coefficients were noted for OHBS- the barrier exercisers and OSES-self efficacy of exercise (R= -0.163 P. value< 0.01). Also, the result showed many positive coefficients between many OHBS- subscales and between OSES subscales (Table 5).

DISCUSSION

The study aimed to assess knowledge, health beliefs, and self-efficacy regarding osteoporosis prevention in Bahrain. We conducted a cross-sectional study of 400 premenopausal women attending outpatient

clinics at primary health care centres. The study had shown inadequately low levels of OKAT, high levels in many OHBS- subscales, and encouraging moderate levels of OSES.

A total pooled prevalence rate was reported to be 24.4% in the eastern Mediterranean region based on 31,593 participants, ultimately increasing the cumulative cost of osteoporosis fragility fractures, particularly in developing countries. The incremental annual cost of osteoporotic geriatric-related fractures is an expensive expanding problem^{8,9}.

The questionnaires investigated participant demographics to acquire more information about our findings. Participants' age and education did not affect their OKAT. These findings are contrary to results reported in studies conducted in Saudi Arabia, New Zealand, and Turkey but consistent with those reported from studies in Brunei^{27,32-34}. However, this finding may be clarified because OKAT may be affected by age and education in wealthy countries.

In contrast, studies in Egypt and India reported no significant correlation between family income and OKAT levels. These studies contradict our findings that family income significantly impacted OKAT levels, highlighted in a Pakistani and another Egypt study^{28,32,35,36}. People with better education levels may have a better chance for knowledge growth on essential issues (e.g., osteoporosis).

The study showed that most participants had adequate levels of overall osteoporosis-preventive behaviour. This finding was unexpected, as

Table 4: Mean and standard deviation of the osteoporosis knowledge and osteoporosis health belief scale and osteoporosis self-efficacy

Instruments	Constructs	Number of items	Range	Mean ± S.D.	Interpretation Related to Osteoporosis
OKAT	Knowledge	20	0-20	7.71 ± 2.91	Low Knowledge
	Perceived Susceptibility	6	6-30	16.88 ± 4.38	Low Perceived Susceptibility
	Perceived Seriousness	6	6-30	17.04 ± 4.33	Low Perceived Seriousness
	Benefits of exercises	6	6-30	21.26 ± 4.48	High Benefits of Exercises
OHBS	Benefits of calcium intake	6	6-30	21.05 ± 4.75	High Benefits of Calcium Intake
	Barriers of exercises	6	6-30	16.04 ± 4.94	Low Barriers to Exercises
	Barriers to calcium intake	6	6-30	15.16 ± 4.93	Low Barriers to Calcium Intake
	Health Motivation	6	6-30	21.43 ± 4.69	High Health Motivation
OSES	Self-Efficacy Exercise	6	0-60	38.49 ± 14.81	Moderate Self-Efficacy Exercise
	Self-Efficacy Calcium	6	0-60	40.25 ± 14.38	Moderate Self-Efficacy Calcium

Table 5: Correlations between knowledge and osteoporosis health belief and osteoporosis self-efficacy

Constructs	1	2	3	4	5	6	7	8	9	10
Knowledge (1)	1.00	0.110*	-0.01	0.063	0.056	0.008	-0.037	0.071	0.054	0.021
Susceptibility (2)		1.00	0.266**	0.215**	0.247**	0.176**	0.084	0.073	-0.001	0.015
Seriousness (3)			1.00	0.236**	0.198**	0.270**	0.263**	0.071	0.154**	0.101*
Benefits of exercises (4)				1.00	0.542**	-0.053	-0.157*	0.399**	0.199**	0.033
Benefits of calcium intake (5)					1.00	-0.064	-0.085	0.384**	0.162**	0.095
Barriers to exercises (6)						1.00	0.503**	-0.175**	-0.163**	0.039
Barriers to calcium intake (7)							1.00	-0.139**	-0.018	-0.062
Health Motivation (8)								1.00	0.147**	0.154**
Self-Efficacy Exercise (9)									1.00	0.615**
Self-Efficacy Calcium (10)										1.00

*: Correlation is significant at the < 0.05 level. **: Correlation is significant at the < 0.01 level.

acceptable behaviour generally depends on sufficient awareness and OKAT, which study participants lack. Most Bahraini participants reported low consumption of dairy products and vitamin supplements, besides low exposure to sunlight. Direct sun exposure for Saudi and Bahraini women was less than for Egyptian, Lebanese, and Singaporean women, which is related to hot weather in the Gulf region^{26,28,37}. These studies suggest that increased OKAT influences better preventive behaviour and clinical outcomes. The first study was performed in Bahrain in 2017 by Gayathripriya, N. et al. observed that only 9.5% of participants had inadequate knowledge. In contrast, other participants had either moderate -or high knowledge, noted in 73% and 17.5%, respectively^{19,21}. Whereas our study was performed on premenopausal women aged 20-49 years, which found that the level of OKAT (High K = 9.5, moderate K = 30.75, and poor K = 59.75) decreased potentially may be explained due to the stressful period of the corona pandemic and that the Bahraini people may not be interested in their improving health knowledge about osteoporosis during the difficult period. Comparing OKAT at two periods: before and after the annoying ancient corona pandemic, is necessary. Women in the premenstrual period at 20-49 years have bone density that tends to stay stable with equivalent amounts of bone formation and bone breakdown. After the postmenopausal period at ≥ 50 years, bone resorption overtakes bone formation, and bone loss speeds up. So, education in premenopausal women is of prime importance.

Such studies are critical because they contribute to national and international efforts to combat osteoporosis by increasing knowledge and awareness. According to a Hungarian study, OKAT scores are higher among younger and more educated participants³⁸. A study conducted among female university students in Jordan confirmed a low level of OKAT with a mean score of 40.5% ($M=8.1/20$)²⁵. A similar lack of OKAT was reported in other studies in Saudi Arabia (62%) and Malaysia (79.4%)^{27,39}. Our study found a significant effect on the OKAT based on family income and employment status.

Many studies have examined the OHBS of university students and the community population. In our research, the OHBS-perceived susceptibility was 16.88 ± 4.38 (moderate perception), which was better than the low OHBS-perceived susceptibility among Jordanian female university students, Vietnam's health care college students, Malaysian health sciences students, and Pakistani female medical schools^{25,40,41}. Bahraini premenopausal females were probably aware of the symptoms and complications experienced by their postmenopausal relatives. Our study revealed an OHBS-seriousness score of 17.04 ± 4.33 (moderate perception), comparable to Jordanian, Vietnamese, Malaysian, and Pakistani students^{25,40,41}. In addition, this study revealed OHBS-perceived benefits of exercise and calcium intake scores of 21.26 ± 4.48 and 21.05 ± 4.75 , respectively. These findings are comparable to Jordanian students, Vietnamese students, Malaysian students, and Qatari women attending primary health care centres^{25,39,42}.

In addition to OHBS-perceived exercise benefits, perceived exercise barriers and calcium intake may either promote or hinder young women from carrying out preventive behaviours toward osteoporosis. The scores for OHBS-perceived barriers to exercise and calcium intakes were 16.04 ± 4.94 and 15.16 ± 4.93 , respectively, indicating that participants had an optimistic view with a few barriers to calcium intake and exercise^{25,39,42}. Consequently, the population in Bahrain should be encouraged to take calcium supplements and participate in regular physical exercise, especially premenopausal women. When asked about OHBS-health motivation toward osteoporosis prevention, participants showed a high mean health motivation (21.43 ± 4.69) compared with premenopausal Jordanian women (19.87 ± 4.34)²⁵.

According to a study conducted by Bandura regarding OSES, individuals who have a high sense of OSES and believe they will achieve their goals are more effective and healthier⁴³. As a result, OSES can assist people in adopting or maintaining healthy behaviours⁴². Based on our study, the participants scored a mean of 78.73, considered a moderate-level OSES- score. This finding corresponded to a study performed in China that showed similar results ($M=72.0$, $SD=23.15$)⁴⁴. However, the score is better than that reported in a survey from Iraq ($M=65.843$, $SD=22.2014$), which has a similar cut-off point, suggesting that females in Bahrain are more likely to participate in health-promoting behaviour; therefore, all primary care physicians in Bahrain were instructed to perform BMD scans or DEXA X-ray absorptiometry on all Bahraini geriatric women ≥ 60 years and to do a fall risk assessment and to encourage early osteoporosis preventive program⁹.

Furthermore, studies also revealed that dietary calcium consumption is associated with slightly better OSES ratings than exercise, possibly suggesting a more substantial level of confidence in altering food habits than changing exercise-lifestyle modification behaviours due to barriers, as noted in this study and those conducted in China and Iraq^{44,45}. In contrast, a survey conducted in the United States found that participants did not regard barriers to exercise as troublesome, resulting in reasonably high confidence in undertaking calcium intake and exercise habits, as demonstrated by their high OSES ratings²⁹.

Implemented many educational programs to enhance OKAT, will upsurge OHBS-susceptibility and seriousness to all postmenopausal women, and urge the importance of self-efficacy calcium intake and practising exercise in decreasing osteoporosis prevalence. Self-efficacy exercise sessions and boosting calcium intake started in the premenstrual age group will reduce the complication of osteoporosis rate. Enhancing belief of exercise's benefit was inversely related to decreasing calcium intake barriers. Also, encouraging exercise efficacy in young women will enhance health motivation for a healthy lifestyle (Table 5). Compared to recent studies on Hong Kong Chinese men, exercise self-efficacy was correlated with young age, perceived exercise benefits, and few barriers to exercise. Self-efficacy of calcium intake was positively correlated with health motivation and self-efficacy with exercise and negatively correlated with barriers to calcium intake⁴⁶.

The Strengths and Weaknesses of the Study: The survey method is considered reliable for determining premenopausal women's knowledge regarding symptoms, risk factors, attitudes, osteoporosis self-efficacy, and health beliefs. Obtaining a paper-form questionnaire in the researcher's presence ensures proper clarification of any inquiry regarding the questionnaire. The questionnaire showed good validity and reliability of the instruments used. Distributing questionnaires in a paper format at health centres was challenging, especially during COVID-19. Hence, some participants answered quickly. Another weakness was not using a combination of methods during survey administration, such as internet-based programs, as it would have covered a larger sample and would have been relatively low cost compared to the paper format. The disadvantage of using a cross-sectional study was including only women who attended an outpatient clinic, so the sample is not necessarily representative (e.g., sick, defaulter women). Another limitation of the survey; it exclusively focused on premenopausal women.

Implications of Findings: According to the study result, the authors recommended providing health education and prevention programs about osteoporosis, especially for perimenopausal women, to raise their awareness of osteoporosis and ensure early preventive measures. Also, to narrow the gap between knowledge and practices to reduce

osteoporosis's burden on the community. National health education on osteoporosis risk factors. In addition, design preventative measures to start in the perimenopausal to reduce morbidity later in women's life. Future research and practice could benefit from our findings regarding the correlations and the other results to have national osteoporosis preventive measures and start calcium, vitamin D, and hormonal replacement therapy in primary care instead of referral to secondary care for treatment. Early assessment candidates for BMD testing and treatment emerge as medically prudent steps in reducing the risk for osteoporosis-related fracture. A significant and growing public health concern, osteoporosis substantially increases the risk for fracture and, in turn, early disability and mortality.

CONCLUSION

A notable number of premenopausal women lacked knowledge about osteoporosis, influencing their awareness of its symptoms, risk factors, and prevention. As a result, community education is critical in raising awareness and increasing self-efficacy. A positive correlation was noted between the OKAT scale and OHBS and between OHBS and OSES subscales. Educational programs should target those who have the lowest levels of knowledge and those who are employed and have low incomes.

Abbreviations: OKAT: Osteoporosis knowledge assessment tool; OHBS: Osteoporosis health beliefs scale; OSES-s: Osteoporosis self-efficacy scale; MD: Medical Doctor

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