



Original Article

Knowledge and practice regarding prevention of osteoporosis among Iraqi women

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Abstract

Background: Osteoporosis is known to cause long-acting disability. This study aimed to explore the knowledge, and preventive practice among women attending the primary health centers (PHC) in Al Ramadi City, west of Iraq.

Methods: A cross-sectional study was conducted between January and March 2022. A simple random sampling technique was recruited to collect samples using face-to-face interviews of women during the routine visit to PHCs. Univariate and bivariate were used to analyze the data. The statistical package for the social sciences was used for data analysis.

Results: Two hundred and fifty women were interviewed with a mean age of 37.9 ± 11.3 years. The majority of them were married (87.0%), and unemployed or housewives (66.0%). Although, most of the participants heard about osteoporosis (238, 95.2%), and the possibility to cause pain before the occurrence of fracture (67.6%), the average knowledge score on osteoporosis was 55.75 ± 18.87 . Furthermore, the surveyed women reported that practices of sunlight exposure ($p=0.000$), calcium-rich foods ($p=0.003$), and Vitamin D supplementation ($p=0.022$) are significantly related to reducing the risk of Osteoporosis. Healthcare providers played a significant role to support women with osteoporosis-related knowledge.

Conclusion: Although most women heard about the disease, their level of knowledge was modest, which might affect the measures necessary to prevent the disease.

Keywords: Osteoporosis, Knowledge, Practice, Prevention, Healthcare workers, Iraq

Background

Osteoporosis stands as a concealed ailment, a multifaceted condition characterized by diminished bone density and heightened susceptibility to fractures [1]. While it primarily afflicts mature females, there exists a subset of young males and females with elevated vulnerability. Nonetheless, the gender disparity is pronounced, with women facing an eightfold higher likelihood of falling prey to osteoporosis compared to their male counterparts. This discrepancy stems from the cessation of estrogen's safeguarding influence, which is operative during reproductive years but wanes post-menopause, leading to a deterioration in bone density [2]. Osteoporosis is influenced by a spectrum of factors, some within our control and others

beyond our influence. Among those we can regulate are factors such as inadequate physical activity, a familial predisposition to osteoporosis, a lower body mass index (BMI), sedentary living, tobacco and alcohol usage, as well as dietary imbalances. Conversely, certain elements are beyond our sway, encompassing gender, genetic inheritance, ethnic and racial background, advancing age, the postmenopausal state, and bodily dimensions [3,4].

The propensity for osteoporosis escalates when confronted with irregular menstruation and the absence of menstruation altogether, known as amenorrhea. Hence, it becomes imperative for young women to familiarize themselves with the potential risk factors associated with menopause. Esteemed health organizations advocate that to avert the onset of osteoporosis, women should be motivated to uphold their bone mineral density through conscientious dietary choices, incorporate Vitamin D and calcium supplementation, and engage in a

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consistent regimen of physical exercises [5,6]. The peak of bone mass density is achieved by the age of 30, beyond which there is a gradual decline in bone density. As individuals age, there's a tendency for diminished natural synthesis of vitamin D [14]. Across numerous European countries, a notable incidence of plasma 25-hydroxyvitamin D levels hovering near or beneath the standard range has been documented among the elderly populace, particularly within the "oldest-old" age group and those residing in environments with limited sun exposure, such as institutions [7,8]. Furthermore, it's worth noting that the pervasive COVID-19 pandemic has played a substantial role in exacerbating the prevalence of vitamin D deficiency among populations [9]. The disruption caused by the pandemic has led to lifestyle modifications, including reduced outdoor activities and limited sun exposure, which in turn has had a tangible impact on vitamin D levels in individuals. As a consequence, a higher number of people are finding themselves deficient in this essential nutrient. This situation underscores the intricate interplay between global health crises and nutritional status, shedding light on the multifaceted nature of public health challenges in the face of unprecedented events [10,11].

Bone fractures stand as the defining indicator of osteoporosis, and imparting knowledge to patients constitutes a vital aspect of effectively addressing this complication [3, 5]. In the absence of awareness, these individuals are likely to remain unaware of their susceptibility to developing osteoporosis. They might not consider requesting diagnostic examinations, adopting preventive measures against the onset of the disease, or recognizing that osteoporosis can commence well before the onset of menopause [12]. Consequently, they could mistakenly believe that preventive actions only become relevant after menopause. This underscores the urgent requirement to heighten awareness regarding osteoporosis and to instill accurate beliefs among both mature and younger women [13]. Numerous intervention-based investigations have demonstrated that improved understanding motivates individuals to actively seek out further insights concerning osteoporosis, ultimately leading to the adoption of lifestyle changes [14,15]. This study aims to explore the knowledge and practice regarding the prevention of osteoporosis among a sample of Iraqi women.

Methods

Study design and setting

A cross-sectional study was carried out at primary health care (PHC) centers in Al-Anbar city, Iraqi between 15th February and 15th March 2022. A convenient sampling technique was recruited to collect female patients during their routine visits to four PHCs (Al- Subaihat Center, Al-Quds Center, Al-Andalus Center, and Al-Habbaniyah Cente). A well-trained independent eight investigators were recruited to collect the data. All women were briefly informed of the background, aims, and expected outcomes of the study, before acquiring verbal consent for participation in the study. Data was collected through direct interviews with patients, documented on paper records, manually entered into a specifically-designed Google Form, and imported as a spreadsheet into the statistical analysis software. Best practices for the protection of patient confidentiality were followed throughout the study process, and all data analysis was done anonymously.

Inclusion and exclusion criteria

All premenopausal women, aged 18-49 years old, and willing to participate. We excluded the pre or postmenopausal women who had already been diagnosed with osteoporosis, young age women (< 18 years old), the care provider's women, and those unwilling to participate in the study.

Sample size

We assumed the response rate will be 50.0% at a significance level of 6.0 and a power of 95.0% to calculate a sample size of 264 participants. A 10.0% was allowed to compensate for possible dropout. The required sample size was 290 (264+26) participants.

Study tool

The questionnaire is composed of four sections. The first section had the socio-economic features, reproductive health data, and source of osteoporosis information. The second section was a semi-structured questionnaire devised to measure the level of women's knowledge regarding different aspects of Osteoporosis and its prevention. The Osteoporosis Knowledge Assessment Tool (OKAT) [16] was the main source of 33 questions designed to explore the respondents' knowledge (knowledge and awareness) about osteoporosis. The response to knowledge questions was either "True," "False," or "Do Not Know" options. The incorrect answer and "Do Not Know" answer were given "zero code", while the correct answer was given "one code" resulting in a total potential score of thirty-three. Then we equally subdivided the total score into three categories: a knowledge score below 11 was regarded as low knowledge, 11-22) as medium knowledge, and above 22 was regarded as a high level of knowledge.

The third section had eight questions about the women's practice (behavior and habits). The total potential score of practice was 8, estimated by one point to the most proper answer for each question. Practice scores ranged (from 1-3) regarded as low practice, (4-6) medium practice, and (7-9) high practice.

Statistical analysis

Analysis of data was carried out using the statistical package for the social sciences (SPSS<Inc., Chicago, III, Version 23). Data was presented in simple measures of frequencies, percentages, ranges, means, and standard deviations, and collated into appropriate tables. Charts were used to illustrate important differences and associations when applicable. The significance of differences in percentages (qualitative data) was tested using Pearson's Chi-square test with the application of Fisher's Exact test whenever applicable. Statistical significance was considered whenever the P value was equal to or less than 0.05.

Results

Socio-demographic characteristics of study participants

The Mean age of patients was 37.9 ±11.3 years (range 18-65 years). The mean BMI of the study sample was 26.4 ± 6.7. Two hundred and seventeen women (87.0%) were married, and 164 women (66%) were unemployed (housewives). The sample was classified according to their educational level into low (N= 103; 41.0%), middle (N= 58; 23.0%), and high (N= 89; 36.0%) educational levels. Table 1 summarizes the sociodemographic characteristics of the study sample.

Table 1: Sociodemographic characteristics of the study sample (N=250)

Characteristic	Categories		N.	%
Age Group (years)	< 20		27	10.8
	20-29		66	26.4
	30-39		55	22.0
	40-49		43	17.2
	50-59		41	16.4
	≥ 60		18	7.2
Weight Classification	Underweight	(BMI <18.5)	11	4.4
	Normal	(BMI 18.5-25)	87	34.8
	Overweight ((BMI 25-30)	86	34.4
	Obese Class I	(BMI 30-35)	42	16.8
	Obese Class II	(BMI 35-40)	17	6.8
	Obese Class III	(BMI >40)	7	2.8
Level of Education	Low	Illiterate	25	10.0
		Reads/Writes	29	11.6
		Primary School	49	19.6
	Middle	Middle School	32	12.8
		High School	26	10.4
	High	Undergraduate	72	28.8
Postgraduate		17	6.8	
Marital Status	Married		217	86.8
	Divorced		11	4.4
	Widow		22	8.8
Occupation	Housewife		164	65.6
	Employed		86	34.4
Smoking	Yes		47	18.8
	No		203	81.2
Alcohol Consumption	Yes		0	0.0
	No		250	100.0

Most of the surveyed women have regular menstruation (202, 80.8%). The mean age of menarche of the study sample was 13.32 ± 1.79 , and 180 women (72%) of the study sample had not yet had menopause at the time of the study.

The mean number of pregnancies was 3.95 ± 3.04 , while the mean number of abortions was 0.52 ± 0.95 . A full summary of the reproductive health data of the study sample can be seen in Table 2.

Table 2: Reproductive health data of the study sample (N=250)

Characteristic	Categories		N.	%
Age of Menarche (years)	11 and below		8	3.2
	12-14		185	74.0
	15-17		56	22.4
	18 and above		1	0.4
Regular Menstruation	Yes		202	80.8
	No		48	19.2
Number of Pregnancies	None		24	9.6
	G 1-2		69	27.6
	G 3-4		69	27.6
	More than 4		88	35.2
Number of Living Children	0		32	12.8
	1		35	14.0
	2		40	16.0
	3		40	16.0
	4		29	11.6
	5+		74	29.6
Number of Abortions	0		170	68.0
	1		48	19.2
	2		23	9.2
	3+		9	3.6
Time of Menopause	Yet to occur		180	72.0
	Before 45		11	4.4
	After 45		59	23.6

The participants' average knowledge score on osteoporosis was 55.75 ± 18.87 (20-100). Table 3 shows that most women heard about osteoporosis (238, 95.2%), and it will cause pain before the occurrence of fracture (67.6%). More than half knew that excessive consumption of beverages such as tea and coffee, and

alcohol might contribute to the stimulation of osteoporosis (54.0%, and 57.7%) respectively. In contrast, a high percentage of women expressed good knowledge about the importance of physical activity and a balanced diet.

Table 3: Women's responses to the knowledge questionnaire of the study (n=250)

No.	Questions	True		False		Don't know	
		n	%	n	%	n	%
1	I've heard of Osteoporosis	238	95.2	12	4.8	0	0.0
2	Smoking contributes to Osteoporosis	135	54.0	94	37.6	21	8.4
3	Stimulant beverages (coffee, tea) contribute to Osteoporosis	144	57.6	80	32.0	26	10.4
4	Alcohol consumption contributes to Osteoporosis	139	55.6	111	44.4	0	0.0
5	I've had Osteoporosis	52	20.8	198	79.2	0	0.0
6	I've had a fractured bone	62	24.8	188	75.2	0	0.0
7	I have a family history of Osteoporosis	77	30.8	173	69.2	0	0.0
8	Positive family history strongly increases the risk of osteoporosis	114	45.6	136	54.4	0	0.0
9	Osteoporosis causes symptoms (e.g., pain) before fractures occur	169	67.6	81	32.4	0	0.0
10	I know about the risk factors of Osteoporosis	101	40.4	149	59.6	0	0.0
11	I know about the physical changes that occur with Osteoporosis	105	42.0	64	25.6	81	32.4
12	I know about the gender deposition of Osteoporosis	137	54.8	35	14.0	78	31.2
13	Osteoporosis means reduced bone density	166	66.4	84	33.6	0	0.0
14	Osteoporosis is a dangerous disease	168	67.2	82	32.8	0	0.0
15	I am worried about Osteoporosis	191	76.4	59	23.6	0	0.0
16	Osteoporosis increases the risk of bone fractures	211	84.4	39	15.6	0	0.0
17	It is easy to know if you are at risk of Osteoporosis through clinical signs and symptoms (e.g., pain)	135	54.0	115	46.0	0	0.0
18	There is some minor gradual loss of bone density in the 10 years following menopause	86	34.4	164	65.6	0	0.0
19	Sedentary lifestyle increases the risk of Osteoporosis	149	59.6	101	40.4	0	0.0
20	Extremely thin or small people are at higher risk of Osteoporosis	122	48.8	128	51.2	0	0.0
21	Thin women are more likely to have Osteoporosis compared to other women	124	49.6	126	50.4	0	0.0
22	Having an imbalanced diet increases the risk of Osteoporosis	180	72.0	70	28.0	0	0.0
23	Long-term use of corticosteroids increases the risk of Osteoporosis	114	45.6	136	54.4	0	0.0
24	Starting at age 50, most women should expect at least 1 bone fracture during their lifetime	136	54.4	114	45.6	0	0.0
25	By age 80, most women suffer from Osteoporosis	159	63.6	91	36.4	0	0.0
26	Excessive salt intake is a risk factor for Osteoporosis	101	40.4	149	59.6	0	0.0
27	Short stature after age 65 is a sign of Osteoporosis	90	36.0	160	64.0	0	0.0
28	Women with early menopause have a higher risk of Osteoporosis	113	45.2	137	54.8	0	0.0
29	Hormonal therapy prevents further bone loss at any age following menopause	81	32.4	169	67.6	0	0.0
30	Long-term nursing (lactation) affects bone density	186	74.4	64	25.6	0	0.0
31	You can get enough calcium by drinking 2 cups of milk a day	230	92.0	20	8.0	0	0.0
32	Sardines and Spinach are good sources of calcium for those unable to consume dairy products	203	81.2	47	18.8	0	0.0
33	Calcium supplementation alone can prevent bone loss	182	72.8	68	27.2	0	0.0

Chi-square and Fisher's exact tests were used to test the difference in women's knowledge of each questionnaire item between different levels of education for statistical significance. Only the items "Smoking contributes to Osteoporosis (p=0.021), Stimulant beverages (coffee, tea) contribute to Osteoporosis (p=0.002), Alcohol consumption contributes to Osteoporosis (p=0.000), I've had a fractured bone (0.031),

Osteoporosis means reduced bone density (p=0.000), Osteoporosis increases the risk of bone fractures (p=0.000), It is easy to know if you are at risk of Osteoporosis through clinical signs and symptoms (e.g., pain) (p=0.000), and having an imbalanced diet increases the risk of Osteoporosis (p=0.017)", were statistically different between women of different levels of education. (Table 4).

Table 4: The difference in knowledge of the questionnaire items about osteoporosis between women of different educational levels in the study (n=250).

No.	Questionnaire Item ("Yes" Response by Level of Education)	Low		Middle		High		P value
		N.	%	N.	%	N.	%	
1	I've heard of Osteoporosis	94	91.3	57	98.3	87	97.8	0.056
2	Smoking contributes to Osteoporosis	45	43.7	33	56.9	57	64.0	0.021*
3	Stimulant beverages (coffee, tea) contribute to Osteoporosis	45	43.7	34	58.6	65	73.0	0.002*
4	Alcohol consumption contributes to Osteoporosis	44	42.7	31	53.4	64	71.9	0.000*
5	I've had Osteoporosis	26	25.2	12	20.7	14	15.7	0.257
6	I've had a fractured bone	33	32.0	15	25.9	14	15.7	0.031*
7	I have a family history of Osteoporosis	33	32.0	16	27.6	28	31.5	0.852
8	Positive family history strongly increases the risk of Osteoporosis	42	40.8	27	46.6	45	50.6	0.402
9	Osteoporosis causes symptoms (e.g., pain) before fractures occur	63	61.2	38	65.5	68	76.4	0.073
10	I know about the risk factors of Osteoporosis	35	34.0	23	39.7	43	48.3	0.123
11	I know about the physical changes that occur with Osteoporosis	41	39.8	20	34.5	44	49.4	0.465
12	I know about the gender deposition of Osteoporosis	50	48.5	29	50.0	58	65.2	0.088
13	Osteoporosis means reduced bone density	51	49.5	41	70.7	74	83.1	0.000*
14	Osteoporosis is a dangerous disease	61	59.2	40	69.0	67	75.3	0.060
15	I am worried about Osteoporosis	71	68.9	48	82.8	72	80.9	0.071
16	Osteoporosis increases the risk of bone fractures	71	68.9	55	94.8	85	95.5	0.000*
17	It is easy to know if you are at risk of Osteoporosis through clinical signs and symptoms (e.g., pain)	42	40.8	30	51.7	63	70.8	0.000*
18	There is some minor gradual loss of bone density in the 10 years following menopause	33	32.0	20	34.5	33	37.1	0.762
19	Sedentary lifestyle increases the risk of Osteoporosis	56	54.4	35	60.3	58	65.2	0.310
20	Extremely thin or small people are at higher risk of Osteoporosis	48	46.6	27	46.6	47	52.8	0.654
21	Thin women are more likely to have Osteoporosis compared to other women	50	48.5	29	50.0	45	50.6	0.960
22	Having an imbalanced diet increases the risk of Osteoporosis	64	62.1	46	79.3	70	78.7	0.017*
23	Long-term use of corticosteroids increases the risk of Osteoporosis	38	36.9	29	50.0	47	52.8	0.063
24	Starting at age 50, most women should expect at least 1 bone fracture during their lifetime	53	51.5	32	55.2	51	57.3	0.708
25	By age 80, most women suffer from Osteoporosis	63	61.2	39	67.2	57	64.0	0.733
26	Excessive salt intake is a risk factor for Osteoporosis	41	39.8	19	32.8	41	46.1	0.293
27	Short stature after age 65 is a sign of Osteoporosis	30	29.1	23	39.7	37	41.6	0.158
28	Women with early menopause have a higher risk of Osteoporosis	39	37.9	26	44.8	48	53.9	0.079
29	Hormonal therapy prevents further bone loss at any age following menopause	37	35.9	16	27.6	28	31.5	0.552
30	Long-term nursing (lactation) affects bone density	73	70.9	46	79.3	67	75.3	0.496
31	You can get enough calcium by drinking 2 cups of milk a day	91	88.3	54	93.1	85	95.5	0.186
32	Sardines and Spinach are good sources of calcium for those unable to consume dairy products	78	75.7	48	82.8	77	86.5	0.169
33	Calcium supplementation alone can prevent bone loss	72	69.9	44	75.9	66	74.2	0.685

Knowledge of the study sample regarding preventative practices that reduce the risk of Osteoporosis (is shown in Table 5). Of note, "Calcium-rich food" was the most known practice by the study sample (92.4%), while "Regular exercise" was the least known practice (71.2%). Table 6 shows the level of knowledge of preventative practices among women of different levels of education, testing for statistical significance using Chi-square and Fisher's exact tests. Only "sunlight exposure ($p=0.000$), calcium-rich foods ($p=0.003$), and Vitamin D supplementation ($p=0.022$)", were equally recognized by women of all levels of education to be important preventative practices for Osteoporosis.

Table 5: Knowledge of preventative practices among the study sample (n=250)

No.	Questionnaire Item	Yes		No	
		N.	%	N.	%
1	Sunlight exposure	230	92.0	20	8.0
2	Physical activity	180	72.0	70	28.0
3	Calcium-rich food	231	92.4	19	7.6
4	Calcium supplementation	222	88.8	28	11.2
5	Vitamin D supplementation	218	87.2	32	12.8
6	Regular exercise	178	71.2	72	28.8
7	Regular light exercise (E.g., walking)	188	75.2	62	24.8
8	General healthy awareness	188	75.2	62	24.8

Table 6: Difference in knowledge of preventative practices for osteoporosis among women of different levels of education (n=250)

No.	Questionnaire Items ("Yes" Response by Level of Education)	Low		Medium		high		0-value
		N.	%	N.	%	N.	%	
1	Sunlight exposure	91	88.3	55	94.8	84	94.4	0.000*
2	Physical activity	59	57.3	45	77.6	76	85.4	0.073
3	Calcium-rich food	90	87.4	56	96.6	85	95.5	0.003*
4	Calcium supplementation	86	83.5	51	87.9	85	95.5	0.065
5	Vitamin D supplementation	80	77.7	51	87.9	87	97.8	0.022*
6	Regular exercise	58	56.3	45	77.6	75	84.3	0.151
7	Regular light exercise (E.g., walking)	64	62.1	47	81.0	77	86.5	0.204
8	General healthy awareness	59	57.3	46	79.3	83	93.3	0.072

The sources of women's knowledge regarding Osteoporosis are listed in Table 7. "Doctors & healthcare workers" was the most common source of information for the women in the study sample (73.2%), while "Books & magazines" was the least common source of information (35.6%).

Table 7: Sources of knowledge regarding Osteoporosis among the study sample (n=250).

Source of information	N.	%
Friends	115	46.0
Social media	128	51.2
Doctors & healthcare workers	183	73.2
Family & relatives	179	71.6
Books & magazines	89	35.6

Discussion

In our research, we conducted an in-depth examination of the levels of knowledge and practical awareness regarding osteoporosis among women residents in the west of Iraq. The findings of our study revealed that a substantial majority of Iraqi women (approximately 95.2%) had encountered information or possessed some familiarity with this medical condition. It is noteworthy that these women exhibited a commendable average score of 55.75 ± 18.87 on our knowledge assessment scale, reflecting a satisfactory grasp of the subject. A similar finding was reported by Alhourri et al. [17]. Delving into the nuances of their understanding, the surveyed women displayed a noteworthy comprehension of osteoporosis and its associated risk factors. A significant aspect of their awareness was centered around recognizing the factors that contribute to the development of osteoporosis [18]. Additionally, it is worth highlighting that more than half of the participants demonstrated a recognition that the process of aging linked to menopause can indeed be a substantial risk factor for osteoporosis [19]. Turning to the parameters of the number of pregnancies and incidences of abortion, the present investigation revealed that slightly less than half of the women examined had a gravidity count exceeding four pregnancies, and less than three-quarters of the cohort did not have a history of abortion (as illustrated in table 2). This correspondence in findings could be attributed to the fact that elevated levels of sex hormones during pregnancy stimulate an enhanced absorption of calcium from the gastrointestinal tract and increased uptake by the skeletal system. It is noteworthy to underscore that such hormonal changes during pregnancy have been identified as potential risk factors for the development of osteoporosis. Consequently, it becomes imperative to provide

pregnant women with supplemental calcium and vitamin D to counterbalance the potential loss of these essential nutrients [20,21]. Our investigation brought to light a compelling insight into the exercise habits of the population under scrutiny, revealing that over 70% of individuals were actively participating in exercise regimens of the recommended type. Among the various forms of exercise, walking emerged as the most prevalent, with a significant majority—75%—of participants engaging in this activity. Notably, this differs from a study conducted among women in New Zealand, where walking also held the distinction of being the most popular exercise choice, albeit with a lower participation rate of 42.0% within the age groups ranging from 20 to 29 years. This intriguing contrast underscores how exercise preferences can differ across populations and age groups, even when a particular activity maintains its popularity [22]. In the context of osteoporosis prevention, maintaining adequate calcium intake is of paramount importance. The guidance surrounding this matter emphasizes the significance of ensuring a sufficiently balanced diet rich in calcium, as this serves as one of the key preventive strategies against the onset of osteoporosis. However, our study revealed that a notable majority of the participants exhibited limited awareness regarding the association between smoking and osteoporosis risk. Surprisingly, only 1.2% of respondents correctly recognized smoking as a potential contributor to the disease. This finding echoes another research endeavor conducted among Pakistani women, where a significant 42.76% of participants lacked awareness about the detrimental impact of smoking on osteoporosis. This shared gap in knowledge, both within a specific demographic (like medical school entrants) and across the broader population, underscores the need for more comprehensive education efforts on this critical aspect of bone health [23]. Interestingly, when it came to the sources of information that the Iraqi women relied upon to gather knowledge about osteoporosis, there were distinct trends [24]. The most prevalent channels for acquiring information were identified as medical professionals including doctors and healthcare workers, along with insights gained from the women's immediate social circle, which included family members and relatives. This suggests that both formal medical advice and informal discussions within their networks played pivotal roles in shaping their understanding of osteoporosis [25].

In summary, our study sheds light on the awareness landscape among Iraqi women regarding osteoporosis. Their considerable familiarity with the condition, coupled with a decent knowledge level, underscores the importance of continuing education

efforts in the realm of bone health. Recognizing the significant roles that healthcare practitioners and close family connections play in disseminating information about osteoporosis could inform future strategies for enhancing awareness and prevention among this population. Beyond the utilization of a cross-sectional design, our study was accompanied by several additional limitations that warrant consideration. Foremost among these limitations was the specific nature of our sample, which was constrained to women who were actively seeking healthcare services at Primary Health Care (PHC) centers. It is important to acknowledge that these women might possess a heightened sensitivity towards their health concerns compared to individuals who are not engaged with such healthcare facilities. This particular demographic bias could influence the overall perceptions and insights garnered from our research. Moreover, the integrity of the data collection process was occasionally disrupted by interruptions experienced by participants while responding to the questionnaire. Such disruptions might have introduced variability or inconsistencies in their answers, potentially affecting the accuracy of the data collected. A significant aspect of our study pertains to the questionnaire itself, where a majority of the questions posed were subjective rather than grounded in objective criteria. This subjectivity introduces the possibility of misinterpretation or misjudgment among respondents. Additionally, there is a concern that these subjective questions could inadvertently prompt participants towards certain responses, potentially introducing a bias in their answers due to the suggestive nature of the questions. To address these limitations and enhance the robustness of future studies, careful consideration should be given to the selection of a more diverse and representative sample that extends beyond healthcare-seeking individuals. Implementing measures to minimize interruptions during data collection and incorporating a mix of objective and subjective questions in the questionnaire could also contribute to a more comprehensive and accurate assessment of the research subject.

Conclusion

The study conducted in western Iraq revealed satisfactory levels of osteoporosis knowledge among adult females. Enhancing awareness through effective health education campaigns could prove instrumental in promoting an understanding of osteoporosis and its associated risk factors, thereby encouraging the adoption of healthy practices that can mitigate bone loss. Notably, approximately 30.0% of the women surveyed had a positive family history of osteoporosis. A significant proportion of them exhibited behaviors such as not taking Vitamin D supplements and having a high consumption of coffee, tea, carbonated beverages, and red meat throughout the week. Encouraging lifestyle changes becomes imperative for this group to proactively prevent osteoporosis. Maintaining optimal dietary habits is a pivotal factor in sustaining bone density, mass, and strength, particularly in women aiming to conceive. Given that women often spend a substantial portion of their time indoors or at work, their limited exposure to sunlight and reduced physical activity compared to men contributes to their heightened vulnerability to osteoporosis. To address this concern, educational initiatives should encompass the installation of informative posters in public spaces, city gathering areas, and healthcare centers. These resources should

emphasize risk factors and preventive measures relevant to women aged 18 to 45 years. Furthermore, the implementation of early screening programs targeting women in the 18 to 45 age group is crucial to proactively identify and manage osteoporosis, minimizing potential complications and adverse outcomes. Public media platforms, particularly television, and radio, offer valuable avenues for disseminating information about adopting a health-conscious lifestyle. By harnessing the power of media, comprehensive awareness campaigns can effectively reach and empower a wider audience to make informed choices for their bone health.

Abbreviation

PHC: Primary Health Centers.

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Availability of data and materials

Data will be available by emailing med.badeaa.thamir@uoanbar.edu.iq

Authors' contributions

All authors Badea'a Thamer Yahyaa (BTY) and, Mustafa Ali Mustafa Al-Samarrai (MAMA) are equally participated in the concept, design, literature search, data analysis, data acquisition, manuscript writing, editing, and reviewing. EBC has read and approved the final manuscript. All authors have read the final manuscript.

Ethics approval and consent to participate

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki (2013). The protocol was approved by the Ethics Committee of the Scientific Issues and Postgraduate Studies Unit (PSU), College of Medicine, University of Anbar (Ref: SR/207 at 21-January-2019). Moreover, written informed consent obtained from each participant after explanation of the study objectives and the guarantee of secrecy.

Consent for publication

Not applicable

Competing interest

The authors declare that they have no competing interests.

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