

Original article

## Awareness and Knowledge of Osteoporosis among Iraqi Women

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### Abstract:

- **Background:** Osteoporosis is a systemic skeletal disorder characterized by a decreasing in bone density which predisposes to fragility fractures. The aim of this study is to evaluate the awareness, sources of information, and the level of knowledge about osteoporosis in a sample of Iraqi women.
- **Method and patient:** In a cross-sectional study, 250 Iraqi women attending the Rheumatology Unit at Baghdad Teaching Hospital from September 2020 to March 2021 were consecutively sampled. A questionnaire was administered through doctor interviews, consisting of three parts: the first gathered socio-demographic and osteoporosis risk factor data. The second part assessed women's awareness, information sources, and knowledge of osteoporosis. The third part focused on assessing the knowledge of osteoporosis among those aware of the disease.
- **Result:** The study involved 250 women with a mean age of  $48.9 \pm 9.01$  years; 51.6% were postmenopausal. 90% were aware of osteoporosis as a medical condition, while 10% had never heard of it. Education was positively correlated with awareness ( $P < 0.001$ ). Among the 225 aware of osteoporosis, the mean total knowledge score was  $12.99 \pm 3.77$  (out of 51.96). 83.1% had fair knowledge (score between  $> 25\% - \leq 75\%$ ), 10.7% had good knowledge (score  $> 75\%$ ), and 6.2% had poor knowledge (score  $\leq 25\%$ ). Educational level, previous Dual-energy X-ray absorptiometry scan, previous low trauma fracture, and calcium/vitamin D supplement intake showed significant associations with knowledge score.
- **Conclusions:** The study revealed that Iraqi women have fair knowledge about osteoporosis, misperception about specific parts of disease, and deficient information particularly to the risk factors.
- **Keywords:** Osteoporosis, body mass index, dual -energy X-ray absorptiometry scan.

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## INTRODUCTION

According to the World Health Organization (WHO) Osteoporosis (OP) is defined as a progressive disorder of the skeletal system characterized by decreasing bone mass and deterioration of microarchitecture of bone tissue, with increasing susceptibility to fractures as a resultant increase in bone fragility <sup>(1)</sup>.

The prevalence of OP persistently advanced as a resultant increase in the elderly population, it was estimated that more than 200 million people worldwide suffer from OP <sup>(2)</sup>.

Osteoporosis prevalence increases with age and vary by race, gender, and ethnicity <sup>(3)</sup>. In spite it occurs at any age, but it is more common in women than men <sup>(4)</sup>. In Iraq, prevalence of OP is higher among postmenopausal women and correlated with older age female and duration of menopause <sup>(5)</sup>.

It has been estimated that lifetime risk of osteoporotic fractures are 44% for women and 25% for men <sup>(6)</sup>. More than 50% of hip fractures will expect to occur in the Asia at 2050 <sup>(7)</sup>. In another study which updated hip fracture projection in Asia showed that 2.28 fold increases in the number of hip fractures in Asia will be occur in 2050 <sup>(8)</sup>.

The pathophysiology of OP is complex and multifactorial. It depends on the genetic factors, environmental, and hormonal determinants as a potential etiological factors responsible for low bone mass <sup>(9)</sup>. With the estrogen deficiency receptor activator of nuclear factor- $\kappa$  B ligand (RANKL) will increase, which is a regulatory molecule that aid in osteoclast differentiation and survival, while osteoprotegerin (OPG) a soluble decoy receptor for RANK that expressed by the cell of osteoblast lineage will decrease. Thus, osteoclastogenesis accelerated as a result of low OPG in comparison to high RANKL concentrations. This explains that estrogen deficiency has direct effect on bone cells osteoblast, osteocyte and osteoclast <sup>(10)</sup>.

The most common relevant clinical impact of OP are fractures and their complications. Which occur most commonly in the vertebrae, proximal femur and distal forearm. Major skeletal site fracture in adults older than 50 years of age should be attributable to OP and urgent assessment and treatment should be initiated <sup>(11)</sup>.

Vertebral fragility fractures are the most common osteoporotic fractures worldwide. The majority of vertebral fractures are silent, increase the risk of subsequent fragility fractures and significantly increase the morbidity and mortality <sup>(12)</sup>. In addition to that, low trauma hip fractures substantially increase the risk for further osteoporotic fractures and premature death. As it was shown that the excess mortality range is from 8.4% to 36% during the first year after hip fracture <sup>(13)</sup>. Osteoporosis related fractures substantially impair patients' quality of life and place economic burden on health care system <sup>(14)</sup>.

Adequate nutrition (adequate calcium intake and vitamin D supplementation), sun exposure, regular weight bearing exercise, avoidance of smoking, and excessive alcohol are modifiable preventive measures that are crucial for bone health <sup>(15)</sup>.

### **Awareness and knowledge**

Appraisal of people's knowledge about OP risk factors and their effect on health is the first measure in prevention strategy, accordingly effective health educational program incorporation can increase awareness and alter the lifestyle <sup>(16)</sup>. Therefore, to raise the people's awareness about OP it is crucial to identify how much is known about the disease by the professional engaged in disease prevention and treatment. Knowledge about the symptoms of the disease can promote early detection of the disease, motivate looking for help attitude, consequently enhancing treatment advantage <sup>(17)</sup>, thus the effective way to conduct disease associated knowledge to the patients are performed through patient educational programs. Such programs about OP have been manifested to increase the knowledge, change attitude <sup>(18)</sup>, improvement in calcium intake, adherence to medication, and physical activity as revealed in multifaceted OP group education <sup>(19)</sup>.

Education programs targeting younger people that is particularly important, such as implementation of OP in teaching course in school, public education, multiple educational programs suggested such as online learning, practical learning, and interactive learning <sup>(16)</sup>.

A study conducted in Canada revealed that a booklet encourages individual to take actions and change the routine behavior in an effort to achieve better health outcome for healthy bone <sup>(20)</sup>. The aim of this study is to evaluate the awareness, sources of the information, and the level of knowledge about osteoporosis in a sample of Iraqi women.

## **PATIENT and METHOD**

### **Study design and setting**

This cross sectional study was administered through interview between the doctor and participants, participants in this study were selected through consecutive sample from the women attending outpatient Rheumatology Unit at Baghdad Teaching Hospital during the period between September 2020 and March 2021.

### **Participants collection**

A total 250 Iraqi women enrolled in the study.

Exclusion criteria: -

Women who refuse to participate.

Women who have difficulties in speech.

Women who have hearing problems.

### **Ethical issue**

Approval and official permission to the study protocol were obtained from the Ministry of Higher Education and Scientific Research, University of Baghdad, College of Medicine,

Rheumatology and Medical Rehabilitation Unit, based on administrative order for accepting the research plan for rheumatology and medical rehabilitation diploma of students numbered 802 and date July 21<sup>st</sup> 2020.

Formal consents were obtained from all participants prior to data collection after clarifying the objective of the study.

During interview the privacy of the data was assured and all personal information that recognize the participants were kept secret.

## Data Collection

Data were collected by questionnaire, designated, and modified on the base of wide literature review and previous studies. It was reviewed and validated by professors and consultant rheumatologists in the University of Baghdad. The questionnaire was tested among 20 Iraqi women before data collection.

Questionnaire composed of three parts:

**1-** The **first part** of the questionnaire collected information about demographic data (age, weight, height, and educational level), lifestyle and risk factors for OP (menopausal state, smoking, calcium and vitamin D supplementation, exercise, previous low trauma fracture and chronic drugs use).

Body mass index was calculated on equation  $BMI = \text{weight kg} / \text{height m}^2$  and categorized according to WHO classification [21]. Educational level was categorized as illiterate, primary school, secondary school, and college or higher education. Smoking categorized to current smoker, ex-smoker, and non-smoker.

**2-** The **second part** of the questionnaire included questions on women awareness of OP disease (if ever heard of OP disease or not), the source of their information about OP, certain questions related to the OP (previous scanning for DXA, ever being diagnosed with OP, and family history of OP).

Those who had never heard of OP disease were thanked, and the remaining questions in the second and third part of the questionnaire were not asked. However, those were aware of OP is a disease completed the remaining questionnaire.

**3-** The **third part** of the questionnaire contained 25 question for evaluation the **knowledge** among awareness group of participants which subdivided into:

**First section:** seven questions on general information about OP, including definition of OP, sign and symptoms of OP, gender prevalence, and hormonal treatment.

**Second section:** eight questions on risk factors, including smoking, advance age, menopause, cortisone, underweight.

**Third section:** six questions on prevention, including physical therapy and calcium rich diet.

**Forth section:** four questions on complications.

Each item had true, false, and don't know choices, each correct answer scored 1 point, each incorrect and don't know answer scored 0. Don't know was added to improve

compliance of hesitant participant. Total score ranged between 0 and 25. Total 25 scores calculated from 100 and percent of knowledge score obtained which classified into three division:

Score ( $\leq 25\%$ ) was considered poor, score ( $> 25\% - \leq 75\%$ ) was considered fair, and score ( $> 75\%$ ) was considered good.

The questionnaire was answered from the participants during interview with the doctor after translation was done and explaining of each question.

### **Statistical analysis**

The data analyzed using Statistical Package for Social Sciences (SPSS) version 25. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Chi square test was used to assess the association between awareness score with certain information and knowledge score with the characteristic of participant and certain information, while fisher exact test was used instead when the expected frequency was less than 5. A level of Probability value (P – value) less than 0.05 was considered significant.

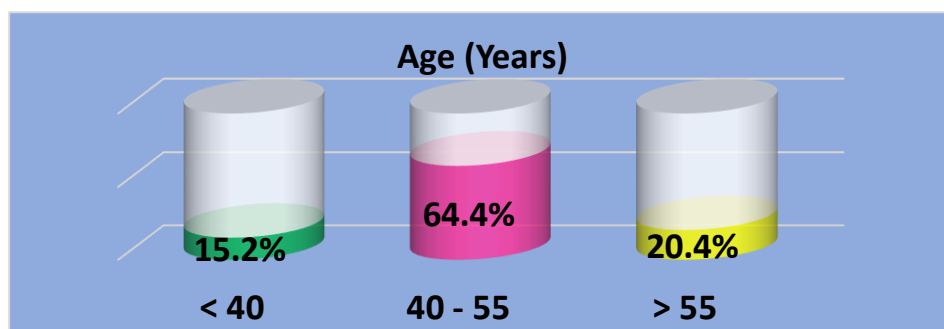
## **RESULTS**

A total of 250 females were the subjects of this study. All of them were evaluated for their awareness of osteoporosis disease.

### **Demographics and characteristics**

Respondent's age ranged from 30 to 66 years with a mean of 48.39 and standard deviation (SD) of  $\pm 9.01$  years. About two thirds 161 (64.4%) of respondents were found in the age group of 40 - 55 years (Figure 1). The calculated BMI had a mean of  $30.68 \pm SD 5.1$  kg/m<sup>2</sup>, and 131 (52.4%) of recruited females were obese (Figure 2).

In this study, 70 (28%) of women were illiterate, 87 (34.8%) had primary school, 60 (24%) had secondary school, and 33 (13.2%) had college or higher education level. 129 (51.6%) were in postmenopausal stage, 121 (48.4%) were in premenopausal stage. 243 (97.2%) non-smokers, 2 (0.8%) current smokers. 17 (6.8%) reported having prior low trauma fracture. Calcium and vitamin D supplements were reported by 79 (31.6%), and 88 (35.2%) of the respondents, respectively, while only 5 (2%) perform regular daily exercise. However, 71 (28.4%) used chronic drugs (Table 1). The highest proportion of chronic drugs users 43 (59.2%) were on antihypertensive drugs and 5 (7%) of chronic drug users were on osteoporotic treatment currently.



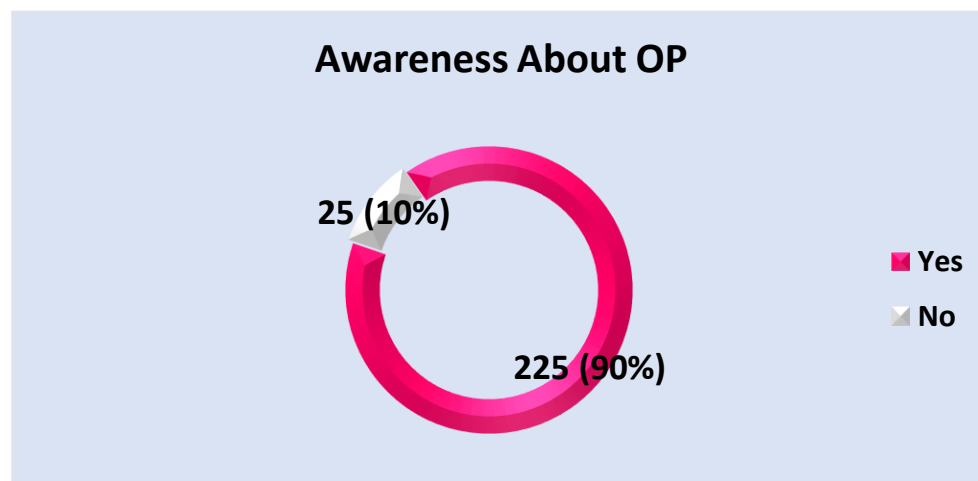
**Figure 1: Distribution of 250 women participated in the study by age.**

**Table 1: Distribution of respondents' demographics and characteristics.**

General Characteristics	No. (n= 250)	Percentage (%)
<b>Educational Level</b>		
Illiterate	70	28.0
Primary School	87	34.8
Secondary School	60	24.0
College or Higher Education	33	13.2
<b>Menopausal Stage</b>		
Premenopausal	121	48.4
Postmenopausal	129	51.6
<b>Smoking Status</b>		
Non Smoker	243	97.2
Current Smoker	2	0.8
Ex- Smoker	5	2.0
<b>Previous low trauma Fracture</b>		
Yes	17	6.8
No	233	93.2
<b>Daily Exercise</b>		
Yes	5	2.0
No	245	98.0
<b>Calcium Supplement</b>		
Yes	79	31.6
No	171	68.4
<b>Vitamin D Supplement</b>		
Yes	88	35.2
No	162	64.8
<b>Chronic Drugs</b>		
Yes	71	28.4
No	179	71.6

### Awareness of osteoporosis

Out of the 250 recruited women, 225 (90%) reported that they were had heard of OP disease, while the remaining 25 (10%) had never heard of the disease (Figure3).



**Figure 2: Distribution of 250 respondent's women by awareness about OP.**  
OP=osteoporosis.

### Information of osteoporosis in the aware women

Among the 225 women who were aware that OP is a disease, 32 (14.2%) of them DXA scan was done previously, 37 (16.4%) of women reported that had diagnosed with OP, 24 (64.9%) of them reported that diagnosis was established by DXA while the remaining 13 (35.1%) by physician word. 51 (22.7%) of women had family history of OP.

There were different sources of information that Iraqi women had taken their information, the most frequent source of their OP information was the doctors 98 (43.6%), followed by friends 47 (20.9%), internet 30 (13.3%), and family members 23 (10.2%) , while 22 (9.8%) of women received information from TV, and the reading was the least source of information 5 (2.2%). As shown in (Table 2).

**Table 2: Distribution of the respondents with awareness of OP by certain information**

General Characteristics	No. (n= 225)	Percentage (%)
Source of OP		
TV	22	9.8
Doctors	98	43.6
Friends	47	20.9
Family Members	23	10.2
Internet	30	13.3
Reading	5	2.2
DXA Scan		
Yes	32	14.2

No	193	85.8
Diagnosed Cases		
Yes	37	16.4
No	188	83.6
Diagnosed by <span style="float: right;">n= 37</span>		
Physician Word	13	35.1
DXA	24	64.9
Family History of OP		
Yes	51	22.7
No	174	77.3

OP = osteoporosis, DXA = dual -energy X-ray absorptiometry.

In the current study, there was a statistically significant association between the women awareness of OP disease and educational level. The proportion of awareness of OP increased with each increase in level of education, with P- value of 0.001.

No significant association was found between the awareness of OP and the age of women (P= 0.637), and menopausal stage (P= 0.1) as shown in (Table 3).

**Table 3: Distribution of the respondents by awareness about OP and certain characteristics.**

Demographic Characteristics	Awareness about OP		Total (%) n= 250	P- Value
	Yes (%) n= 225	No (%) n= 25		
Age (Years)				
< 40	33 (86.8)	5 (13.2)	38 (15.2)	<b>0.637</b>
40 – 55	147 (91.3)	14 (8.7)	161 (64.4)	
> 55	45 (88.2)	6 (11.8)	51 (20.4)	
Educational Level				
Illiterate	55 (78.6)	15 (21.4)	70 (28.0)	<b>0.001</b>
Primary School	79 (90.8)	8 (9.2)	87 (34.8)	
Secondary School	58 (96.7)	2 (3.3)	60 (24.0)	
College or Higher Educ.	33 (100.0)	0 (0)	33 (13.2)	
Menopausal Stage				
Premenopausal	105 (86.8)	16 (13.2)	121 (48.4)	<b>0.1</b>
Postmenopausal	120 (93.0)	9 (7.0)	129 (51.6)	

OP = osteoporosis

### Knowledge about osteoporosis among awareness group

#### First section: General information

Results of women's knowledge about the general information showed that among 225 women who had heard about OP, 208 (92.4%) answered correctly to the definition of OP, 199



(88.4%) recognized that common sign and symptom of OP is a recurrent bone fractures, and 161(71.6%) reported that OP not affects only women.

However, 221 (98.2%) thought that OP usually causes a lot of pain. Only 17 (7.6%) answered correctly to the question that said hormonal therapy can be used in treatment of OP (Table 4).

**Table 4: Distribution of the respondents' responses about general information of OP.**

Questions	Responses	
	Correct no. (%)	Incorrect no. (%)
Osteoporosis is a condition of losing bone strength	208 (92.4)	17 (7.6)
Osteoporosis is diagnosed by physical examination	81 (36.0)	144 (64.0)
Osteoporosis usually causes a lot of pain	4 (1.8)	221 (98.2)
Headache is one of the usual manifestations of OP	45 (20.0)	180 (80.0)
One of the common signs and symptoms of OP is a recurrent bone fractures	199 (88.4)	26 (11.6)
Osteoporosis affects only women	161 (71.6)	64 (28.4)
Hormonal therapy can be used in the treatment of OP	17 (7.6)	208 (92.4)

OP = osteoporosis.

### **Section two: Risk factors**

Results of women's knowledge about the risk factors of OP were as follows: the highest proportion 208 (92.4%) of participants were aware that advance age is a risk factor for OP, and 161 (71.6%) were aware that vitamin D deficiency increases the risk of OP.

About half 112 (49.8) of studied women recognized that menopause is a risk factor for OP, and 119 (52.9%) of women agreed that smoking is considered a risk factor for OP.

Only 28 (12.4%) of women agreed that underweight women have OP more than overweight women, and only 42 (18.7%) recognized that family history of OP is a risk factor for OP. However, 128 (56.9) didn't know that using certain drugs e.g. (cortisone) increases the risk of OP (Table 5).

**Table 5: Distribution of the respondents' responses about risk factors of OP.**

Questions	Responses	
	Correct no. (%)	Incorrect no. (%)
Advance age is a risk factor for OP	208 (92.4)	17 (7.6)
Underweight women have OP more than overweight	28 (12.4)	197 (87.6)
Menopause is a risk factor for OP	112 (49.8)	113 (50.2)
Smoking is considered a risk factor for OP	119 (52.9)	106 (47.1)
Family history of OP is not considered a risk factor for OP	42 (18.7)	183 (81.3)
Vitamin D deficiency increases the risk of OP	161 (71.6)	64 (28.4)
Using certain drugs e.g. (cortisone) increases the risk of OP	97 (43.1)	128 (56.9)
High amount of coffee consumption leads to OP	72 (32.0)	153 (68.0)

OP = osteoporosis.

### Section three: Prevention

Concerning results of women's knowledge about prevention of OP, 221 (98.2%) knew that diet which is rich in calcium e.g. milk can reduce the risk of OP, 212 (94.2%) accepted that dairy product is effectual in prevention of OP, 202 (89.8%) agreed that physical exercise important for prevention of OP, and 179 (79.6%) agreed that vitamin D is beneficial for prevention of OP.

Highest false 172 (76.4) answers were about the question that says excess meat consumption reduces OP development (Table 6).

**Table 6: Distribution of the respondents' responses about prevention of OP.**

Questions	Responses	
	Correct no. (%)	Incorrect no. (%)
Diary product is effectual in prevention of OP	212 (94.2)	13 (5.8)
Enough calcium intake during growth age of children have a role in OP prevention	146 (64.9)	79 (30.1)

Vitamin D is beneficial for prevention of OP	179 (79.6)	46 (20.4)
Increase meat consumption reduces OP development	53 (23.6)	172 (76.4)
Diet which is rich in calcium e.g. (milk) can reduce the risk of osteoporosis	221 (98.2)	4 (1.8)
Moderate physical exercise important for prevention of OP	202 (89.8)	23 (10.2)

OP = osteoporosis.

#### Section four: Complications

Results of women's knowledge about complications of OP showed that, the highest percentage of correct responses 166 (73.8%) were to the question that says OP leads to hip fracture and disability, followed by 124 (55.1%) about OP is a complication of certain diseases. However, 200 (88.9%) of women believed that OP predisposes to joint swelling and stiffness as shown in (Table 7).

**Table 7: Distribution of the respondents' responses about complications of OP**

Questions	Responses	
	Correct no. (%)	Incorrect no. (%)
Osteoporosis leads to hip fracture and disability	166 (73.8)	59 (26.2)
Osteoporosis predisposes to joint swelling and stiffness	25 (11.1)	200 (88.9)
Diabetes illness is one of the consequences of OP	76 (33.8)	149 (66.2)
Osteoporosis is complication of certain diseases	124 (55.1)	101 (44.9)

OP = osteoporosis.

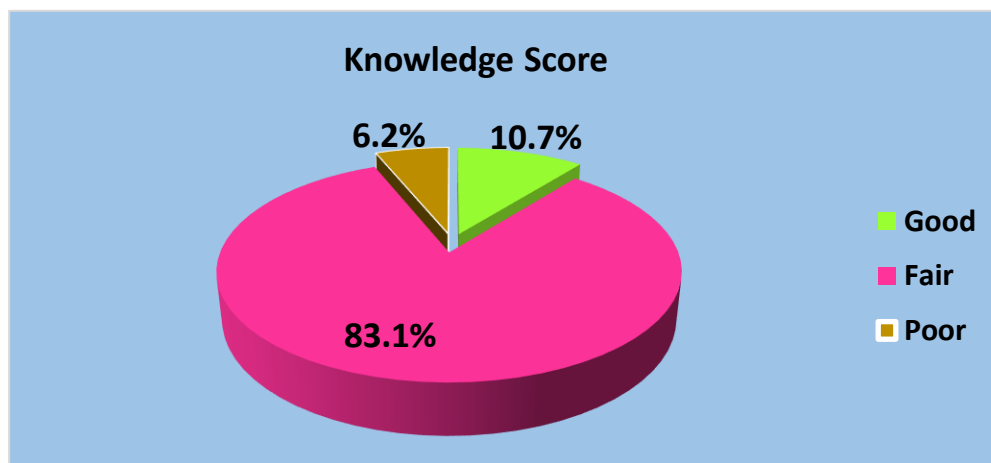
#### knowledge score of Osteoporosis

In this study OP knowledge score was fair. The score was in range between 3-21 (12%-84%) out of 25 question and the mean total knowledge score was  $12.99 \pm SD 3.77$  (51.96).

In this study, the overall percent knowledge score of 225 women about OP showed that 24 (10.7%) had good knowledge which achieved score (>75%), 187 (83.1%) had fair knowledge with score between (>25% - ≤75%), and 14 (6.2%) were with poor knowledge that obtained score (≤25%) (Figure 4).

In this study, there was a statistically significant association between knowledge score and educational level, prior low trauma fracture, taking calcium and vitamin D supplements, and DXA scan. The proportion of good knowledge score was significantly higher among the highly educated women (24.2%, P= 0.001), women who had previous low trauma fracture

(35.3%, P= 0.002), women with calcium and vitamin D supplements (20.3%, P= 0.001 and 20.5%, P= 0.001, respectively), and those who had previous scanning of DXA (28.1%, P= 0.001). Other factors showed that no significant association (P> 0.05) with knowledge score (Tables 8 and 9).



**Figure 4: Distribution of 225 respondent's women by knowledge score.**

Good = score (> 75%), Fair = score (> 25% - ≤ 75%), Poor = score (≤ 25%)

**Table 8: Distribution of the participants by knowledge score and certain characteristics.**

Variable	Knowledge Score			Total (%) n= 225	P- Value
	Poor (%) n= 14	Fair (%) n= 187	Good (%) n= 24		
<b>Age Group (Years)</b>					
< 40	5 (15.2)	26 (78.8)	2 (6.1)	33 (14.7)	0.089
40 – 55	5 (3.4)	126 (85.7)	16 (10.9)	147 (65.3)	
> 55	4 (8.9)	35 (77.8)	6 (13.3)	45 (20)	
<b>BMI Level</b>					
Normal	3 (10.0)	23 (76.7)	4 (13.3)	30 (13.3)	0.72
Overweight	3 (4.1)	62 (83.8)	9 (12.2)	74 (32.9)	
Obese	8 (6.6)	102 (84.3)	11 (9.1)	121 (53.8)	
<b>Educational Level</b>					
Illiterate	12 (21.8)	42 (76.4)	1 (1.8)	55 (24.4)	0.001
Primary School	2 (2.6)	71 (92.2)	4 (5.2)	77 (34.2)	
Secondary School	0 (0)	49 (81.7)	11 (18.3)	60 (26.7)	
College or Higher Ed.	0 (0)	25 (75.8)	8 (24.2)	33 (14.7)	
<b>Menopausal stage</b>					
Premenopausal	6 (5.7)	92 (87.6)	7 (6.7)	105 (46.7)	0.188
Postmenopausal	8 (6.7)	95 (79.2)	17 (14.2)	120 (53.3)	
<b>Smoking Status</b>					
Non Smoker	14 (6.4)	182 (83.5)	22 (10.1)	218 (96.9)	0.393
Current Smoker	0 (0)	1 (50.0)	1 (50.0)	2 (0.9)	

Ex- Smoker	0 (0)	4 (80.0)	1 (20.0)	5 (2.2)	
<b>Previous low trauma fracture</b>					
Yes	0 (0)	11 (64.7)	6 (35.3)	17 (7.6)	<b>0.002</b>
No	14 (6.7)	176 (84.6)	18 (8.7)	208 (92.4)	
<b>Daily Exercise</b>					
Yes	1 (20.0)	3 (60.0)	1 (20.0)	5 (2.2)	0.315
No	13 (5.9)	184 (83.6)	23 (10.5)	220 (97.8)	
<b>Calcium Supplement</b>					
Yes	1 (1.3)	62 (78.5)	16 (20.3)	79 (35.1)	<b>0.001</b>
No	13 (8.9)	125 (85.6)	8 (5.5)	146 (64.9)	
<b>Vitamin D Supplement</b>					
Yes	2 (2.3)	68 (77.3)	18 (20.5)	88 (39.1)	<b>0.001</b>
No	12 (8.8)	119 (86.9)	6 (4.4)	137 (60.9)	
<b>Chronic Drugs</b>					
Yes	3 (4.8)	56 (88.9)	4 (6.3)	63 (28)	0.336
No	11 (6.8)	131 (80.9)	20 (12.3)	162 (72)	

P- value = probability value.

**Table 9: Distribution of the participants by knowledge score and certain information.**

Variable	Knowledge Score			Total (%) n= 225	P- Value
	Poor (%) n= 14	Fair (%) n= 187	Good (%) n= 24		
<b>Source of OP</b>					
TV	0 (0)	20 (90.9)	2 (9.1)	22 (9.8)	0.232
Doctors	8 (8.2)	81 (82.7)	9 (9.2)	98 (43.6)	
Friends	6 (12.8)	37 (78.7)	4 (8.5)	47 (20.9)	
Family Members	0 (0)	21 (91.3)	2 (8.7)	23 (10.2)	
Internet	0 (0)	24 (80)	6 (20)	30 (13.3)	
Reading	0 (0)	4 (80)	1 (20)	5 (2.2)	
<b>DXA Scan</b>					
Yes	3 (9.4)	20 (62.5)	9 (28.1)	32 (14.2)	<b>0.001</b>
No	11 (5.7)	167 (86.5)	15 (7.8)	193 (85.8)	
<b>Diagnosed Case</b>					
Yes	0 (0)	30 (81.1)	7 (18.9)	37 (16.4)	0.061
No	14 (7.4)	157 (83.6)	17 (9.0)	188 (83.6)	
<b>Family History of OP</b>					
Yes	0 (0)	43 (84.3)	8 (15.7)	51 (22.7)	0.058
No	14 (8.0)	144 (82.8)	16 (9.2)	174 (77.3)	

OP = osteoporosis, P- value = probability value, DXA = dual -energy X-ray absorptiometry, BMI = body mass index

## DISCUSSION

### Awareness

This study evaluates awareness and knowledge of OP among Iraqi women. In this study, 90% of Iraqi women had heard of OP disease. This was similar to previous findings in Turkey, Riyadh, Saudi Arabia, and Malaysia, that 90%, 88% and 87.1% of their participants heard that OP is a health condition respectively <sup>(22-24)</sup>. However, in study carried out among Singapore only 58% of women had heard of OP disease <sup>(25)</sup>. This was discordant to the present study. The explanation for that may be different population in each study and higher educational level among participants in Singapore was low in comparison to present studied women 1.5%, 13.2% respectively, as in present study which was found that majority of those didn't hear of OP were illiterate, educated women were more aware that OP is a medical condition, which significantly impact on the awareness ( $p < 0.001$ ). However, no significant association was found between age, menopausal status and awareness in the present study. These findings were in line with the study conducted in Riyadh, Saudi Arabia showed that hearing of OP positively correlated with education ( $p < 0.001$ ) while age and menopausal status was not significantly associated <sup>(23)</sup>.

### Knowledge

This study showed that Iraqi women had fair level of knowledge, some wrong information and facts about the OP. Although 90 % of them were aware that OP is health issue, however their information was deficient and incorrect about certain portions of the disease including clinical course of the disease and risk factors, this may be attributable to the facts that women obtained insufficient truths about OP from their information sources and lack of educational programs that may aid to improve their knowledge.

Different studies evaluated OP knowledge with different questionnaires and among different populations. The total mean score of the knowledge in present study was  $12.99 \pm SD 3.77$  (51.96%) out of 25 questions. In study done in 2016 among 375 Iraqi women to assess their level of knowledge about OP that used different questionnaire which were excluded those having OP, total mean score was 54% <sup>(26)</sup>. Knowledge of Iraqi women is still in fair level even after including osteoporotic women in the present study. Mean knowledge score in the present study was slightly comparable to that study carried out in Riyadh, Saudi Arabia with questionnaire reviewed by two orthopedic specialists, mean knowledge score was 56.6% among 443 participants <sup>(23)</sup>, and to the study conducted among 560 Lebanese women which showed that mean knowledge score was  $24.13 \pm SD 6.12$  out of 42 total score <sup>(27)</sup>. However, mean knowledge score among 270 Turkish women was 63.1% <sup>(22)</sup>. That was higher than the percent study. This may be explained by difference in the statements that used to assess their knowledge and the rate of educational level among participants of Turkish women was higher in comparison to present study 59%, 41.3% respectively. In a study conducted among 375 women in Tabuk, Saudi Arabia showed that studied women had poor knowledge that 33.90% of them achieved score  $\leq 25\%$  <sup>(28)</sup>, while in present study women that achieve score  $\leq 25\%$  was 6.2%,

explanation under that may be higher illiterate women in Tabuk, which was 58.7% in comparison to present study that was 24.4%.

In the current study, doctor was the main source of information among 43.6% of studied Iraqi women that was similar to study carried among women in Tabuk, Saudi Arabia in which 32% of them reported that physician as the main source of their information also <sup>(28)</sup>. TV, web and reading were the least sources in the present study. The association between knowledge and these sources was not significant in present study. This was consistent with that study carried out among Egyptian women <sup>(29)</sup>. While TV was the main source of women's information in different studies carried out among, Saudis, Singapore, Iran <sup>(23,25,30)</sup>, and participants in Malaysia relayed on newspaper as main source <sup>(24)</sup>. Different in cultural and social background of participants between these studies may account to this variation.

This study showed that educational level positively correlated with the knowledge score ( $P=0.001$ ). This finding was in agreement with these several studies in Riyadh, Saudi Arabia, Singapore, Lebanon, India and Turkey <sup>(23,25,27,31,32)</sup> ( $P<0.005$ ,  $P<0.001$ ,  $P<0.005$ ,  $P<0.001$ ,  $P<0.05$ ) respectively. Women with higher educational degree notice, evaluate health related truths and utilize these capability to improve knowledge of OP.

Present study didn't show statistically significant association between women age group and the knowledge score which was in line with these studies <sup>(26,31)</sup>. However, these studies showed that OP knowledge affected with age, younger age group have better knowledge <sup>(28,33)</sup>. This could be due to different study design or sampling procedure.

It has been reported that history of previous fragility fracture was associated with high mean knowledge scores, as experience with illness may encourage patient to seek knowledge. Although statistically had no impact on the level of knowledge <sup>(34)</sup>. In another study showed that there was no significant association between the knowledge level and fracture history <sup>(33)</sup>. However, present study revealed a significant association between history of low trauma fracture and the knowledge score ( $p=0.002$ ). This may be explained by variation in the studies characteristics or size of the samples.

The rate of bone mineral density (BMD) testing among Iraqi women was 14.2%. Similar to the rate among women in Riyadh, Saudi Arabia 14% <sup>(23)</sup>, Turkish women 14.6% <sup>(32)</sup>, and among Iranian women was 9.5% <sup>(30)</sup>. In present study, women who underwent DXA had higher knowledge score which was statistically significant ( $p=0.001$ ). Data reported that women those have checked BMD previously were aware about OP considerably more than others <sup>(32)</sup>. Another study carried out in China which didn't reveal any significant association between knowledge score and previous DXA scan which was inconsistent to result of present study ( $p=0.26$ ) <sup>(35)</sup>. This discrepancy may be explained by different characteristics of participants between the studies that 53% of participants in previously mention study was male. As it was reported that women were more knowledgeable about OP than men <sup>(36)</sup>.

In addition to that, present study found a significant association between women that taking calcium, vitamin D and knowledge score ( $p=0.001$ ,  $p=0.001$ ). The effect of these factors on knowledge were also found in study conducted among Lebanese women which showed that women taking calcium and vitamin D supplements were more knowledgeable about OP than those do not take, this may attributable to concept that greater health literacy women have capability in observing and understanding health facts and lay these truths into habit through crucial finance <sup>(27)</sup>. Another study also revealed a significant association between calcium intake and the knowledge ( $p=0.005$ ) <sup>(37)</sup>. Significant association was also found among Iranian women between preventive activities score of women with knowledge score (adequate calcium intake, BMD checked previously, hormone replacement, adequate osteoporotic exercise, exposure to sun, reading about OP ( $p=0.03$ ) <sup>(30)</sup>.

In present study, prevalence of women reported that they have OP was 16.4% and was about 9.4% in study among Turkish women <sup>(32)</sup>. Although some women that reported having OP in the current study knew about some aspects of disease because personal experience but significant association between established OP and the knowledge score was not found ( $p=0.06$ ). This finding was in agreement with previously mentioned study that also reported no significant association between women having OP and knowledge level <sup>(32)</sup>. However, in study conducted among Norwegian population showed that those suffering from OP associated with higher knowledge ( $p<0.001$ ) <sup>(36)</sup>. Such discrepancy may be related to the difference in the sample size between studies which was larger ( $n= 1514$ ) among Norwegian.

In addition to that knowing someone with OP also have better knowledge among Norwegian <sup>(36)</sup>. This was inconsistent to the finding in the present study that showed women with family history of OP didn't have better knowledge than whole studied women. This result was in agreement with study conducted among Bruneian women attending Orthopedic clinic which showed that there was no significant impact of family history on the knowledge score <sup>(18)</sup>. This could be due to different sample size between studies, as sample size among Norwegian was very high.

Regarding menopausal status, present study showed that there was no statistically significant association between menopausal status and the knowledge score. This result was in agreement with these studies <sup>(18,31)</sup>.

It was reported that chronic drug use, BMI, exercise, and smoking history was not significantly associated with the knowledge score <sup>(26)</sup>. These were consistent to the present study that showed no statistically significant association between these factors and the knowledge. Also, it was reported that those who have diabetes and on chemotherapy treatment which were susceptible for losing bone were less knowledgeable about OP <sup>(27)</sup>.

Knowledge evaluation in present study regarding section one showed that majority of Iraqi women that heard of OP knew the definition of OP 92.4 % which was similar to that study



among Turkish women that 90% of them defined OP correctly <sup>(22)</sup>. Although majority of women identified common sign of OP is a recurrent bone fractures while majority of them believed that OP usually causes a lot of pain, that only 1.8% identified that OP not usually causes pain. Study among Tabuk women reported that only 13.1% of them recognized that Pain is not first symptom for OP <sup>(28)</sup>. Majority of women didn't know about hormonal therapy which Only 7.6% were agree that hormonal therapy may be used in treatment of OP. This was consistent to that reported among Indian women that only 8.6% of them were aware to hormonal therapy <sup>(31)</sup>. Lack of use of hormone replacement therapy among Iraqi women may be behind this unfamiliarity.

On evaluating Iraqi women knowledge in regard to risk factors for OP, majority of them had lack of knowledge about risk factors, that 52.9% of women in present study identified that smoking, 32% recognized that high amount of coffee, and only 12.4% of them identified that underweight are risk factors for OP. These results were somewhat similar to that study in Turkey which showed that women who identified Smoking, excess coffee and low body frame are risk factors for OP were 52.2%, 45.6%, 29.3% respectively <sup>(22)</sup>. In present study only 49.8% of women reported that menopause and only 18.7% of women agreed that family history of OP are risk factors. About 67.4% of Turkish women knew that menopause, and 60.4% of them agreed that first degree relative are risk factors for OP <sup>(22)</sup>. In another hand, study among Malaysian population showed higher knowledge regarding risk factors, in which 80%, 65.7%, 63.8%, 56.5%, 75.8% of them respectively identified that family history of OP, caffeine, smoking, thin frame and postmenopausal are risk factors for OP <sup>(24)</sup>. Explanation for these variations may be a lack of focusing the sources of information that Iraqi women had taken their knowledge on the risk factors. In addition to that, it has been reported that knowledge about OP significantly differ with different geographical area <sup>(37)</sup>.

Regarding to complication, 78.8% of women in present study identified that hip fractures and disability is consequences of OP, this suggests that Iraqi women knew that disability from fractures are outcome of OP, which affect patient quality of life <sup>(14)</sup>, while majority of women in present study 88.9% didn't differentiate between OP outcome and arthritis.

Better knowledge evaluated among Iraqi women regarding prevention, about 98% of women knew that calcium rich diet and 89.9% reported that physical exercise is important for prevention in which these results suggest important point, because nutrition and weight bearing exercise have role in maximizing bone strength during adulthood and later on life <sup>(38)</sup>. Lower finding revealed among women in Tabuk that 56.3% of them reported that calcium rich food protective <sup>(28)</sup>. Although majority of women in present study reported that physical exercise important for bone health, but they didn't apply this knowledge on practice that only 2% perform exercise regularly, this return to lack of educational programs that demonstrate beneficial type of physical exercise and motivate them to performance it regularly, and may be

lower socioeconomic status, as showed in many data that higher socioeconomic was correlated with physical activity <sup>(37)</sup>.

The limitation of this study is that the sample size may not be illustrative the whole Iraqi women, and certain information's such as OP diagnosis, previous low trauma fracture and supplements were dependent on the participants announce.

## **CONCLUSION**

In the present study, despite the fact that majority of Iraqi women aware that OP is a medical condition, but they have fair level of knowledge, misperception about specific parts of disease, and deficient information particularly to the risk factors.

## **RECOMMENDATIONS**

1. It is recommended to designate public educational program address risk factors, symptoms and consequences of OP through health care providers in the primary health care center, via mass media such as TV and radio, and booklets.
2. Medical professionals, especially physician should improve the osteoporotic patient's wrong impression about OP and give correct and adequate information to those who have high risk of disease with various communication channels such as simple informative leaflet.
3. Increase people awareness to different sources of nutrition and their crucial roles on bone health during period of child growing and later on life with identifying sufficient amount to be recommend for different ages and arouse them to perform physical exercise.
4. It is advice to provide education to all people with particular attention on those with low level of education and illiterate.

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