Original Article

doi:10.31674/mjn.2025.v16i04.013

MJN

Osteoporosis Patients' Knowledge Concerning Prevention Measures Related to Fractures, Baghdad, Iraq

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ABSTRACT

Background: The Osteoporosis-related fractures (ORF) are a result of an imbalance between osteoblasts and osteoclasts. Osteoporosis's consequences can lead to fractures, disability, and poor life quality. It has been reported to increase and enhance knowledge and awareness about health education in terms of protection from ORF. **Objectives:** The study aimed to assess Osteoporosis patients' knowledge towards prevention measures related to fractures. **Methods:** This is a descriptive cross-sectional study in a purposive sample of 60 patients attending the outpatient clinic of rheumatology in Baghdad teaching hospitals, Iraq, carried out from February 2024 to June 2024. The data on the questionnaire prepared with the support of literature were collected using a patients information form with 37 questions to investigate patients' knowledge towards prevention measures related to osteoporosis fractures. Descriptive statistics were used to illustrate the frequencies of the study variables. A bivariate analysis was carried out using ANOVA and *t*-tests. *P*-values less than 0.05 were considered significant. The statistical analyses were conducted using SPSS, version 25. **Results:** It was revealed the mean age was (54.2) years old with an SD of (11.7) years, the females accounted for (83.3%), the obese represented (48.3%), and the primary educational attainment was (40%). A (76.7%) of them haven't had a previous fracture, (93.3%) have back pain, and (40%) are complaining from Rheumatoid Arthritis. **Conclusion:** It's concluded the importance of disseminating awareness about Osteoporosis and fracture prevention and performing continuous workshops to enhance knowledge and practices. Also, improving early detection and management of Osteoporosis, and implementing further interventional studies are essential.

Keywords: Fractures; Knowledge; Osteoporosis; Patients

INTRODUCTION

Osteoporosis (OP) is considered a chronic disease due to a decline in bone mass and microarchitecture that leads to bone fragility and increased fracture risk (Abtahi, 2021). Osteoporosis-related fractures (ORF) lead to psychological discomfort; other site fractures; dependence; a reduction in daily life activity performance; and, in addition, death (Kahwati *et al*., 2025). Fracture-related morbidity at the hip, which is a central skeletal site, is much greater than at the other sites (Kahwati *et al.*, 2025). Two types of OP are identified: Type I that occurs at postmenopause and leads to vertebral fractures and Type II that is related to advanced age and leads to the risk of hip fracture (Alam, Ibrahim & Amrosy, 2023). The ORF is a result of an imbalance between the action of osteoblasts and osteoclasts due to decreased bone mass density. Osteoporosis is called a 'silent disease' because the patient didn't have any pain or symptoms, usually until the fracture happened (Shari, 2016).

According to reports, many risk factors lead to OP that include sex (female), age, ethnic background, early menopause, late menarche, family history of OP, smoking, alcohol intake, vitamin D deficiency, low calcium intake, high caffeine intake, prolonged immobility, being underweight, diseases of the endocrine, rheumatic, gastrointestinal and chronic obstruction of the lung, anorexia nervosa, and depressed mood (Al-Hafidh, Al-Ani & Gorial, 2019). Many risk factors and fracture types (mainly at vertebrae) are necessary to diagnose low BMD and to assess the fracture risk with the severity of OP (Lloret *et al*., 2024). Both sexes are influenced by OP after fifty years, and the prevalence of the disease is increasing as the age advances in women, which leads to an increased likelihood of bone fragility. Women with OP have had fair to good levels of health follow-up and fair weight control. So, the health follow-up and weight control needed to be more complied with (Mohammed & Abdulwahed, 2021).

Received: August 1, 2024 Received in revised form: February 22, 2025 Accepted: March 3, 2025

Determination of ORF was done by the site of fracture and revealed the fracture types that are not usually related to OP (Sahib, 2018). In the primary care centres, OP was not diagnosed due to poor availability of Dual Energy X-ray Absorptiometry scans (DEXA) and other related causes. The prediction of 10-year risk for developing a major ORF like hip by using the fracture risk assessment tool (FRAX), which is an online web-based tool, is an easily available and inexpensive tool (Cherian, Kapoor & Paul, 2019).

The impact of health beliefs, preventive behaviours, and biochemical levels should be assessed about OP (Abdul-Hameed, 2012). Many studies focus on enhancing the knowledge of disease risk factors, preventive behaviours, and the importance of early diagnosis that result in good preventive programmes and prevalence declining (Alrashidy, 2021). Secondary fractures can be prevented in patients who have a previous fracture by the efforts of nurses. The knowledge uptake has been changed for the healthcare providers (physicians and nurses) in relation to fracture prevention by post-intervention instructions (Rodrigues *et al*., 2024).

Increasing patients' knowledge is important and it can be spread as much as possible through brochures, illustrative posters, audio-visual means, and performing health programmes to keep a healthy life (Hussein & Atiyah, 2016). Patient education is effective and necessary to increase knowledge and change behaviour. Lifestyle behaviours adaptation as reported in many studies to prevent ORF include physical activity engagement, calcium and vitamin D supplements intake, alcohol reduction, and maintaining normal body weight (Beaudart *et al*., 2022). Risk of fractures and falls can be prevented by physical therapy, which is considered a beneficial non-pharmacological method to decrease the rate of bone loss (Rodrigues *et al*., 2024). Rubæk *et al*. (2024) identified many mechanisms to manage the physical activity that triggered participants to lead more physical activity achievement during the disease course. It can be achieved by reassurance in newly diagnosed members without fractures. Also, meeting with participants can activate peer reflection and a healthy diet achievement.

There is a significant impact of the educational programme to prevent OP and to enhance health behaviours, especially in postmenopausal ladies (Ahmed, Mohammed & Kareem, 2023). Patient education to promote and keep healthy lifestyle behaviours is the responsibility of nurses and other health care professionals by means of providing opportunities to visit the hospital and office, community-based activities, and health fairs (Imbeah, 2020).

Knowledgeable nurses are a key position that creates a significant difference in OP prevention and the people's quality of life enhancement because they might then have disability, life-threatening fractures, and death prematurely. The nursing scope is concerned with various measures that minimise or prevent loss of bone; learning about preventable risks is deserved by the patients with OP to enable them to live with a qualified life. Osteoporosis is a worldwide health concern that affects millions of people and requires international healthcare and active interaction with other members of a multidisciplinary team (Ali & Khalida, 2023; Smeltzer & Qi, 2014). The study aimed to assess Osteoporosis patients' knowledge towards prevention measures related to fractures.

METHODOLOGY

Research Design and Setting

A descriptive study design was applied to assess the patients' knowledge toward prevention measures of ORF.

Participants and Sampling Procedure

The sample size was calculated based on a single population proportion formula with the assumption of a margin of error of 5%, a sample proportion of 50% (50% probability of getting the largest sample size), and a confidence level of 95%. Population (patients with Osteoporosis) was less than 150, and the recommended sample size is 60. With purposive sampling technique, patients were recruited from a rheumatology outpatient clinic in one selected hospital within the Baghdad area. Approximately 60 participants were asked to answer the survey. The inclusion criteria were patients diagnosed with osteoporosis who attended the rheumatology outpatient clinic to follow their health status throughout the research time counted in the research, and those who were not fit for the inclusion criteria were excluded. The participants were approached with a subject information sheet, and informed consent was taken before data collection. All involvement in the study was voluntary, and

their confidentiality was maintained. The data was kept confidential by the researcher, and no identifiers, such as name or Identity Card were not used in the questionnaire to protect respondents' privacy and anonymity.

Data collection and Outcome Measurements

A set of questionnaires was used to gather the data. Section 1 was demographic characteristics, including gender, age, BMI, education and residence. Section 2 dealt with patients' clinical data. section 3 was patient Knowledge Assessment Tool regarding prevention methods related to osteoporosis fractures (OKAT) to assess the knowledge level. The tool is a revised version of the Knowledge Assessment Tool (Winzenberg *et al*., 2003). The instrument comprises 37 multiple-choice items, and the total number of correct answers for each question represents the knowledge level of the participant. The highest possible score is 111, and a knowledge percentage score of ≥ 60% is considered a satisfactory level.

Statistical Analysis

The statistical data analysis was done by the utilisation of the Statistical Package of the Social Science (SPSS) version (25). The descriptive data analysis was used through Frequencies (F), Percentages, Mean (M), and Standard Deviation (SD). And the inferential statistics used the ANOVA and *t*-test.

Ethical Consideration

This study got ethical approval the Research Ethics Committee, College of Nursing, University of Baghdad, Iraq with reference number RST 5 on 30th January, 2024.

RESULTS

The results in the table 1 shows that the dominant age group was 53–59 years, with a mean age of 54.2 years and a standard deviation of 11.7 years. Most participants were female (83.3%). Nearly half (48.3%) were obese, and 40% were primary school graduates. A majority (96.7%) lived in urban areas.

Table 1: Demographical Data Distribution of the Study Sample (n= 60)

Variables	Characteristics	Frequency	Percentage (%)
Age Group (year)	25 - 31	4	6.67
	32 - 38	3	5
	39 - 45	6	10
	46 – 52	6	10
	53 – 59	22	36.67
	60 ¯ 66	11	18.33
	67 – 73	7	11.67
	≥ 74	1	1.66
	Mean ± SD 54.2 ± 11.7		
Sex	Male	10	16.7
	Female	50	83.3
Body Mass Index (BMI)	Under weight	1	1.7
	Normal weight	12	20
	Overweight	18	30
	Obese	29	48.3
Educational Level	Read and write	16	26.6
	Primary school graduate	24	40
	Intermediate school graduate	9	15
	Preparatory school graduate	4	6.7
	Bachelor's degree	5	8.3
	Higher degree	1	1.7
	Diploma degree	1	1.7
Residence	Urban	58	96.7
	Rural	2	3.3

The Clinical Characteristics Distribution

Table 2 showed 76.7% with no previous fracture injury, 55% had a previous fall or accident, 93.3% who have back pain, 63.3% who didn't take osteoporosis supplements, 86.7% weren't smoking, and 98.3% who didn't take alcohol.

A percentage of 43.3 of the female sample reached the age of maturation between 13 and 16 years old. Not using corticosteroid therapy was represented by 73.3%, and 40% of them were suffering from Rheumatoid Arthritis.

Table 2: Clinical Characteristics Distribution of the Study Sample (n= 60)

	Characteristics	Frequency	Percentage
Previous Fracture Injury	Yes	14	23.3
	No	46	76.7
Previous Fall or Accident	Yes	27	45
	No	33	55
Back Pain	Yes	56	93.3
	No	4	6.7
Taking Supplements for Osteoporosis	Yes	22	36.7
	No	38	63.3
Smoking	Yes	3	5
	No	52	86.7
	Previous smoker	5	8.3
Alcohol Intake	Yes	1	1.7
	No	59	98.3
Age at Maturation for Females (10 were men and formed a percent of 16.7)	Less than 13 years	23	38.3
	13 – 16 years	26	43.3
	More than 16 years	1	1.7
Taking Corticosteroids	Yes	16	26.7
	No	44	73.3
Chronic Diseases	No disease	2	3.33
	Rheumatoid Arthritis	24	40
	Loss of appetite	1	1.67
	Hyperthyroidism	2	3.33
	Vit. D3 deficiency	2	3.33
	Type 2 diabetes mellitus	3	5
	Crohn's disease	4	6.67
	Hypertension	13	21.67
	Asthma	1	1.67
	Systemic Lupus Erythematosus (SLE)	4	6.66
	Alopecia Areata	1	1.67
	Breast cancer	1	1.67
	Hysterectomy	2	3.33

Distribution of the Sample According to their Knowledge about the (OKAT) Scale

Table 3 revealed poor and fair level of knowledge in all responses of patients about the scale used.

Table 3: Distribution of the Sample According to their Knowledge about the (OKAT) Scale

No.	Items	Mean	SD	Ass.
1	Osteoporosis means weak and sore bones	1.5	0.53	P
2	Osteoporosis occurs when the rate of bone loss is greater than the rate of building it	1.46	0.59	P
3	Having higher bone mass at the end of childhood does not give any protection against the development of osteoporosis later in life	1.31	0.46	P
4	It's easy to tell if you're at risk of osteoporosis by my clinical risk factors	1.46	0.59	P
5	Family history of osteoporosis strongly predisposes a person to osteoporosis	1.56	0.69	P
6	Osteoporosis is more common in men	1.53	0.62	P
7	Osteoporosis affects men and women of all races	1.73	0.66	F
8	At the age of 80, the majority of women suffer from osteoporosis	1.73	0.54	F
9	From age 50, most women can expect at least one fracture before they die	1.56	0.56	P
10	White women are at higher risk of fracture compared to other races	1.36	0.51	P
11	Women who have passed menopause are more likely to develop osteoporosis	1.51	0.62	P
12	There is a small amount of bone loss in the ten years following the onset of menopause	1.5	0.59	P
13	Cigarette smoking can contribute to osteoporosis	1.5	0.59	P
14	Fractures occur when falling or doing simple exertion such as bending or coughing for a person with osteoporosis	1.63	0.68	P
15	Men and women with short stature are more likely to develop osteoporosis	1.45	0.59	P
16	A low level of sex hormones such as estrogen in women and testosterone in men leads to osteoporosis	1.35	0.48	P
17	Hyperthyroidism, parathyroidism and adrenal hormone cause bone loss	1.45	0.53	P
18	People with low calcium are more likely to develop osteoporosis	1.95	0.67	F
19	Falls are just as important as a decrease in bone strength in causing fractures	1.63	0.59	P
20	Drinking alcohol in moderation has little effect on osteoporosis	1.38	0.52	P
21	High salt intake is a risk factor for osteoporosis	1.31	0.53	P
22	The risk of osteoporosis is higher in people with inflammatory bowel disease, kidney or liver disease, cancer and rheumatoid arthritis	1.6	0.61	P
23	Long-term treatment with corticosteroid drugs such as prednisone and cortisone are linked to osteoporosis	1.66	0.68	P
24	Medications for the treatment or prevention of gastric reflux, cancer and the body's rejection of implanted organs lead to osteoporosis	1.51	0.59	P
25	People who spend a lot of time sitting are more likely to develop osteoporosis	1.6	0.55	P
26	Osteoporosis usually causes symptoms (such as pain) before fractures occur	1.6	0.58	P
27	Osteoporosis leads to an increased risk of bone fractures in the spine, hip and wrist	1.76	0.53	F
28	A patient with osteoporosis suffers from short stature and curvature of the body forward over time	1.78	0.66	F
29	Any kind of physical activity is useful for osteoporosis	1.63	0.48	P
30	Weight maintenance exercises and activities that promote balance benefit the bones, and walking, jumping and lifting weights are more beneficial	1.81	0.62	F
31	An adequate amount of calcium can be achieved from eating two glasses of milk a day	1.71	0.61	F
32	Sardines and broccoli are good sources of calcium for people who can't eat dairy products	1.61	0.64	P
33	Calcium supplements alone can prevent bone loss	1.43	0.56	P
34	You can take the recommended calcium supplements, if the person's diet does not contain enough calcium.	1.6	0.52	P
35	Vitamin D improves the body's ability to absorb calcium and bone health in other ways	1.71	0.58	F
36	Hormone therapy prevents further bone loss at any postmenopausal age	1.36	0.51	P
37	There are no effective treatments for osteoporosis available in Iraq	1.4	0.49	P
Total mean of score		1.55		

Cut point of table 3: 0.66, Ass. : Assessment level, P: Poor knowledge (1 – 1.66), F: Fair knowledge (1.67 – 2.33), G: good knowledge (2.34 – 3).

The Association between Socio-demographic characteristics and the Knowledge of the Study Sample by ANOVA and *t*-test

Table 4 showed that there was a significant different association between knowledge with their education level at ($p = 0.001$). In addition, there was a significant different association between patients' knowledge and the number of children at a high level ($p = 0.003$).

Table 4: The Association between Socio-demographic Characteristics and the Knowledge of the Study Sample by ANOVA and t-test

Socio-demographic Variables	*df*	Frequency	*P* value	Sig.
Age	59	0.88	0.63	N.S.
Sex (T-test)	59	0.63	0.53	N.S.
BMI	56	0.74	0.53	N.S.
Education Level	52	4.37	0.001	H.S
Residency (T-test)	58	0.98	0.32	N.S.

N.S=non significant; H.S=highly significant

DISCUSSION

The Distribution of Demographic Data

Table 1 showed that the age group from 53 to 59 years formed the highest proportion, 36.67%, with a mean age of 54.2 years. This indicates that the age group most affected by OP is typically adulthood. A study by Naser in 2017 reported a similar result, with the dominant age group being 50 to 59 years, representing 40%. In contrast, the study by Abdurrahman and Putra in 2024 found that 39.7% of the sample were aged between 40 to 50 years, with a mean age of 51.09 years. According to present study females represented the majority of the sample at 83.3%, and based on the previously mentioned mean age, they were affected by primary OP likely due to menopause. Supporting this finding, the study by Wang *et al*. (2016) reported that women outnumbered men, with a distribution of 297 (68.2%) females to 139 (31.8%) males.

The study results show that 48.3% of the sample were obese, indicating that patients with a high body mass index (BMI) may be at increased risk of developing OP. However, the findings of Chan *et al*. (2022) contradict this, reporting that both men and women with OP were underweight, with BMI rates of 46.3% and 45.2%, respectively. Mohammed and Abdulwahed (2021) found that 74.29% of their participants diagnosed with OP maintained a fair level of weight control. Additionally, Ali and Khalida (2023) noted that low body weight is considered an independent risk factor for OP. The results also indicate that 40% of the sample were primary school graduates, suggesting a need to enhance their knowledge and awareness through educational programmes about OP. Supporting this, Park *et al*. (2017) found that 81.5% of patients had an elementary level of education. Furthermore, 96.7% of the sample lived in urban areas, implying that OP is more prevalent in urban settings, potentially due to unhealthy lifestyles. Ameen and Rabe (2016) also found that 52.2% of their study sample resided in urban areas. In contrast, Mohamed Abdelrahman *et al*. (2024) reported that 50.8% of participants were from rural areas.

According to Table 2, 76.7% of the sample had no history of previous fractures. Liao and Chu (2024) noted an anticipated increase in patients with OP-related fractures (ORF), while Naser (2017) reported that 55% of participants had a history of fractures. This highlights the need for focused health education programmes aimed at reducing pain, improving physical function, and enhancing quality of life. Table 2 also shows that 55% of the participants had no history of falls or accidents. Ali and Khalida (2023) emphasized that OP patients are at higher risk for falls and fractures due to reduced bone strength. They also highlighted the effectiveness of the Nijmegen Falls Prevention Program (NFPP) in reducing falls and improving balance in OP patients.

The study findings revealed that 93.3% of the patients experienced back pain, indicating that they were suffering from pain due to OP. Liao and Chu (2024) also reported that most patients experienced severe chronic lower back pain resulting from spinal fractures. About 63.3% of the sample did not take supplements to reduce or treat OP, despite the mean age of 54.2 years and the majority being female. Naser (2017) supported this finding, noting that 75% of participants did not take supplements. Similarly, Yusuf *et al.* (2018) and Liu *et al*. (2018) emphasized that although anti-osteoporotic medications are effective, high rates of non-adherence—such as not initiating treatment, incomplete adherence to regimens, or early discontinuation—lead to negative outcomes.

Regarding smoking, Table 2 indicates that 86.7% of the patients were non-smokers. This could be attributed to the predominance of female participants, suggesting that smoking is not a primary risk factor for

OP in this sample. Fahmy *et al*. (2021) similarly found that 80% of their patients did not smoke. The results also showed that 98.3% of the participants did not consume alcohol, likely due to the majority being females from the Islamic faith. Chan (2026) reported comparable findings, noting that 65.8% of males and 82.4% of females were non-drinkers. Likewise, Naser (2017) found that 95% of participants were non-drinkers.

Additionally, 43.3% of the females in the study had their menarche between the ages of 13–16 years, indicating a normal age range for maturation. In contrast, Mohamed Abdelrahman *et al*. (2024) found that most females (73%) experienced earlier menarche between 11–13 years. Ameen and Rabe (2016) also reported that 58.9% of their female participants began menstruation at ages 11–12.

Most of the sample (73.3%) reported that they were not taking corticosteroids, which may suggest that the majority have primary OP, particularly given the dominant age group associated with menopause in this study. Similarly, Sayed-Hassan and Bashour (2013) found that 78% of patients had no history of steroid therapy. The study also showed that 40% of patients had rheumatoid arthritis, suggesting that this condition may contribute to OP. In contrast, Naser (2017) reported that 85% of participants did not suffer from rheumatoid arthritis. Additionally, Fahmy *et al*. (2021) noted that 56.5% of participants had hypertension rather than other chronic diseases.

Regarding Table 3, the findings revealed that patients with OP demonstrated poor to fair levels of knowledge based on the applied scale. Pinar and Pinar (2020) found that participants achieved a higher total mean score on the OKAT, indicating the effectiveness of health education interventions in increasing knowledge and reducing risk behaviors related to OP. Similarly, Khaleel and Atiyah (2022) reported that most patients initially had inadequate knowledge about OP—particularly concerning physical activity and diet—but showed improved awareness after receiving educational programs.

As for Table 4, there was a statistically significant association between knowledge and education level ($p = 0.001$). However, no statistically significant differences were found between total knowledge scores and variables such as age, sex, BMI, and residence. Fahmy *et al*. (2021) also found a significant difference ($p < 0.05$) in overall knowledge scores between men and women.

Limitation

There were many participants who refused to participate in or accomplish the study, and data collection was limited to the Baghdad Teaching hospital, because the DEXA Scan machine in other hospitals was out of order, which led to limited sample numbers and caused an effect on the generalisation of the study result due to the small numbers of patients.

CONCLUSION

It has been found that the knowledge level of prevention measures among patients was poor and fair levels. The need to educate the patients about OP and ORF because they've had primary educational attainment. Most of them haven't had a previous fracture, and the majority have back pain, which refers to the importance of performing the education programme to reduce or prevent fractures and re-fractures related to OP. The highest percentage of the patients complaining from Rheumatoid Arthritis that emphasizing the literature that stated this disease is considered a risk factor for OP. The patients' responses revealed a poor level of knowledge, which gives a reason for improving the knowledge to prevent the ORF.

Based on the mentioned findings, it's recommended to disseminate the knowledge and awareness about OP and its consequences, perform continuous workshops for elderly people to enhance their knowledge about the prevention of ORF, provide early detection and management of OP, and implement further interventional studies to improve the quality of life and reduce the risk of fracture in high-risk people in the future. Also, in order to decrease the incidence of fractures, it is suggested to apply protective screening tests related to OP.

Conflict of Interest

The authors declare that they have no competing interests.

ACKNOWLEDGEMENT

The authors are thankful to the faculty of the Adult Nursing department, the Ministry of Health, Iraq for sponsoring and granting permission for this study to be conducted, and all the patients for their cooperation, understanding, and assistance that led to the successful completion of this work.

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