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## Assessment of Students' Knowledge Regarding Osteoporosis in College of Nursing/ University of Sulaimani

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#### Abstract

**Background:** Osteoporosis is a skeletal disease characterized by reduced bone mineral density and increased bone fragility, leading to a higher risk of fractures. It is a prevalent condition, especially among the elderly, with common fracture sites, including the hip, spine, and wrist.  
**Aim:** This study aimed to assess the knowledge of osteoporosis among nursing students at the College of Nursing, University of Sulaimani.

**Methods:** Ninety-one nursing students from the College of Nursing, University of Sulaimani, participated in this study using a non-probability convenience sampling technique. The Facts on Osteoporosis Quiz (FOOQ) questionnaire was used to gather data, which was then analyzed using the Statistical Package for Social Sciences (SPSS, version 23).

**Results:** The mean age of the students was  $20.83 \pm 2.73$  years. Of the participants, 53.8% had fair knowledge about osteoporosis, and an equal percentage (53.8%) were female. Additionally, 50.5% of the students lived with their families, and 64.8% had a preparatory school background. Students were knowledgeable about certain aspects: 83.5% knew multiple prevention methods, 78% recognized the need for increased calcium during growth, 74.7% understood the risk posed by high caffeine and low calcium intake, and 73.6% were aware of the fracture risk in women over 50 without preventive measures. However, there were significant knowledge gaps: only 28.6% knew that walking does not benefit osteoporosis, 22% identified low-weight females as higher risk and 28.6% knew the calcium content in a glass of milk.

**Conclusions:** The study reveals that nursing students at the University of Sulaimani have inadequate knowledge of osteoporosis, particularly in areas related to prevention and treatment. This highlights the need for enhanced educational interventions.

**What is already known about the topic?** It is known that nursing students' knowledge of osteoporosis is crucial for future healthcare roles, as they will play an essential part in educating patients on prevention and management. However, studies often show gaps in knowledge about osteoporosis risk factors, prevention, and treatment among nursing students, highlighting the need for improved education and training in this area.

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## INTRODUCTION

Osteoporosis is a skeletal disease that increases the risk of bone fractures by eroding bone fragility and reducing bone mineral density (Brown, 2021; Johnston & Dagar, 2020).

It is a well-known common illness that is frequently encountered in older adults. Bone fractures brought on by osteoporosis can damage any bone, although the hip, spine, and wrist are the most frequently affected (Walker & Shane, 2023) (Fischer & Haffner-Luntzer, 2022).

According to statistics on osteoporosis, there are an estimated 8.9 million fractures worldwide each year; because of the chronic bone disease's silent pattern, patients may not feel any discomfort until the first fracture occurs (Camacho et al., 2020). The incidence of osteoporosis in older adults is 21.7% worldwide, with Asia having the highest prevalence (24.3%), followed by Europe (16.7%), and America (11.5%). Additionally, osteoporosis affects 12.5% of older men and 35.3% of older women globally ("Management of Postmenopausal Osteoporosis: ACOG Clinical Practice Guideline No. 2," 2022). Following menopause, bone loss occurs more quickly in women than men (Kobayakawa et al., 2021). Osteoporosis affects 13%–18% of women over the age of 50, and it affects 70% of adults over the age of 80, according to one estimate (Reid, 2020).

Osteoporosis is a progressive loss of bone mass without changes to the bone's composition; it is linked to increased bone fragility, which could ultimately result in fractures (Cosman, Langdahl, & Leder, 2024). The pathogenesis of osteoporosis is multifaceted and influenced by environmental, genetic, and hormone effects. Increasing age, sex, premature menopause, prior fractures,

parental hip fractures, and race are non-modifiable risk factors for osteoporosis; low body mass index, smoking, drinking, and recent use of systemic corticosteroids are the modifiable risk factors (McClung & Clark, 2022).

Since osteoporosis is a silent disease, prevention must be planned early. Primary preventive interventions, such as early risk factor detection, teaching and counselling those at risk about disease prevention, and timely and appropriate treatment, can help lower mortality and morbidity rates and costs (Polyzos, Anastasilakis, Efstathiadou, Yavropoulou, & Makras, 2021). Nursing practitioners are the first link in the multidisciplinary management chain when it comes to informing patients about the many components of this disease's evaluation and care (Ruiz-Esteves, Teysir, Schatoff, Yu, & Burnett-Bowie, 2022). It has been reported that nursing staff may have insufficient understanding of osteoporosis prevention. It is crucial for nurses to educate patients and the public about primary and secondary osteoporosis prevention. Therefore, providing nurses with higher education may be essential for them to fulfill this duty (Payer, Smaha, Kužma, Killinger, & Jackuliak, 2021). Younger age-related lifestyle adjustments are thought to benefit osteoporosis and other chronic conditions. The risk of developing osteoporosis has decreased with programs encouraging bone mineralization during adolescence and maintaining high peak bone mass (Wan et al., 2022). The link between low bone mass and knowledge of nutritional, activity, and lifestyle choices that are most likely to play a role in the development of osteoporosis provides support for the logic behind the focus on

enhancing osteoporosis-relevant knowledge (Ford et al., 2011).

## **METHOD**

A quantitative descriptive study was employed to evaluate the level of knowledge on osteoporosis among nursing students at the University of Sulaimani in Iraq: anon-probability, a convenience sample size of 91 students from the College of the Nursing University of Sulimani. The sample was selected according to specific inclusion and exclusion criteria.

The inclusion criteria are as follows: students in the College of Nursing/University of Sulaimani, second, third, and fourth stages. Moreover, we exclude first-stage students.

To evaluate the knowledge of osteoporosis, the Facts on Osteoporosis Quiz (FOOQ) questionnaire was used, which consisted of 20 true and false questions and was generated based on the osteoporosis consensus conference of the National Institutes of Health in 2000. It has a content validity of 0.87 and an internal consistency reliability of 0.76 (Ailinger, Lasus, & Braun, 2003). The questionnaires were distributed and collected during the first semester of the academic year 2019–2020.

## **Data collection methods:**

A descriptive self-reported questionnaire was conducted before interviewing the subjects; an introduction was given, and the purpose of the research was explained personally by the researcher to the subjects to achieve verbal informed consent. All those who agreed to participate were given the Facts on Osteoporosis Quiz and a demographic form to complete.

## **STATISTICAL ANALYSIS**

The data was analyzed using the statistical package for social science (SPSS, version 22). Demographic

characteristics and scores on the FOOQ were summarized using descriptive summary measures and expressed as mean  $\pm$  standard deviation for continuous variables and number (percentage) for categorical variables.

## **RESULTS**

91 of the 335 student nurses completed the questionnaires; the response rate was 27.1%.

Table (1) shows that the majority (87.9%) of the study sample was between the ages of 18 and 22 years old, and the mean age was (20.8 $\pm$ 2.73) The result of this study is inconsistent with a previous study by Kandil et al. (2017) they found that the mean age of Nursing Students was 20.83  $\pm$  1.48 years. Regarding gender, more than half (53.8%) were female. About half (50.5%) of the study sample remained with their families; (64.8%) of the study sample came from preparatory schools, and about one-third (35.2%) were from technical institutes.

Table 2 shows the participant's level of knowledge about osteoporosis. It reveals that most of the sample (83.5%) knew many ways to prevent osteoporosis. (78%) participants knew that the most critical time to build bone strength is between 9 and 17 years of age, and osteoporosis affects men and women. (76.9%) the sample was aware that a lifetime of low calcium and vitamin D intake does not increase the risk of osteoporosis. Also, most of the respondents (75.8% and 74.7%) knew that alcoholism is not linked to the occurrence of osteoporosis and that high caffeine combined with low calcium intake increases the risk of osteoporosis, respectively.

The actual statement that "Without preventive measures, 20% of women older than 50 years will have a fracture due to osteoporosis in their lifetime" (item 10) was correctly identified by 73.6

percent of respondents. The actual statement that "lower-weight women have osteoporosis more than heavy women" (item 4) was correctly identified by just (22%) of respondents. This suggests that in education programs, emphasis must be placed on the fact that body mass index (BMI) positively correlates with bone density.

As shown in Figure 1, more than half of the sample (53.84%) had a fair level of knowledge about osteoporosis, 41.75% of participants had a good level of knowledge, and the proportion of participants with a poor level of knowledge recorded the lowest percentage of 4.39% among the study sample.

**Table 1. Demographic characteristics related to participants**

<b>Age Groups</b>	<b>Frequency</b>	<b>Percentage</b>
<b>18-22</b>	80	87.9
<b>23-27</b>	8	8.8
<b>&gt;27</b>	3	3.3
<b>Mean± SD</b>	<b>20.8±2.73</b>	
<b>Gender</b>	<b>F</b>	<b>%</b>
<b>Male</b>	<b>42</b>	<b>46.2</b>
<b>Female</b>	<b>49</b>	<b>53.8</b>
<b>Family residency</b>	<b>F</b>	<b>%</b>
<b>Dormitory</b>	<b>45</b>	<b>49.5</b>
<b>With family</b>	<b>46</b>	<b>50.5</b>
<b>Stage</b>	<b>F</b>	<b>%</b>
<b>Second</b>	<b>37</b>	<b>40.7</b>
<b>Third</b>	<b>25</b>	<b>27.5</b>
<b>Fourth</b>	<b>29</b>	<b>31.9</b>
<b>Graduation</b>	<b>F</b>	<b>%</b>
<b>Preparatory school</b>	<b>59</b>	<b>64.8</b>
<b>Technical institute</b>	<b>32</b>	<b>35.2</b>
<b>Total</b>	<b>91</b>	<b>100</b>

**Table 2. Participants' responses to the questionnaire (FOOQ) (n = 91) .**

Variables	Correct Answer	False	True
		No. (%)	No. (%)
<b>1-Physical activity increases the risk of osteoporosis.</b>	False	37(40.7)	54(59.3)
<b>2-High-impact exercise improves bone health.</b>	True	44(48.4)	47(51.6)
<b>3-Most people gain bone mass after 30 years of age.</b>	False	43(47.3)	48(52.7)
<b>4-Lower weight women have osteoporosis more than heave weight women</b>	True	71(78.0)	20(22.0)
<b>5- Alcoholism is not linked to the occurrence of osteoporosis</b>	False	22(24.2)	69(75.8)
<b>6- The most critical time to build bone strength is between 9 and 17 years of age</b>	True	20(22.0)	71(78.0)
<b>7- Normally, bone loss speeds up after menopause.</b>	True	33(36.3)	58(63.7)
<b>8- High caffeine combined with low calcium intake increases the risk of osteoporosis</b>	True	23(25.3)	68(74.7)
<b>9- There are many ways to prevent osteoporosis</b>	True	15(16.5)	76(83.5)
<b>10- Without preventive measures,20% of women older than 50 years will have a fracture due to osteoporosis in their lifetime</b>	True	24(26.4)	67(73.6)
<b>11- There are treatments for osteoporosis after it develops</b>	True	47(51.6)	44(48.4)
<b>12- A lifetime of low calcium and vitamin D intake does not increase the risk of osteoporosis.</b>	false	21(23.1)	70(76.9)
<b>13- Smoking does not increase the risk of osteoporosis</b>	false	34(37.4)	57(62.6)
<b>14- Walking has a great effect on bone health</b>	false	65(71.4)	26(28.6)
<b>15- After menopause, women not on estrogen need about 1,500 mg of calcium (for example, five glasses of milk) daily.</b>	True	46(50.5)	45(49.5)
<b>16- Osteoporosis affects men and women</b>	True	20(22.0)	71(78.0)
<b>17- Early menopause is not a risk factor for osteoporosis</b>	false	32(35.2)	59(64.8)
<b>18- Replacing hormones after menopause cannot slow down bone loss.</b>	false	27(29.7)	64(70.3)
<b>19- Children 9 to 17 get enough calcium from one glass of milk daily to prevent osteoporosis.</b>	false	65(71.4)	26(28.6)
<b>20- A family history of osteoporosis is not a risk factor for osteoporosis.</b>	false	24(26.4)	67(73.6)
<b>Average score -12.16</b>			

## **DISCUSSION**

Our study aimed to examine the knowledge level of students at the University of Sulaimani /College of Nursing about osteoporosis. The assessment method of choice was a self-administered questionnaire previously used in several research studies.

Primary and secondary osteoporosis prevention education for patients and the public is a crucial responsibility of nurses. In order to achieve changes in practice linked to the prevention and treatment of osteoporosis, it has been determined that nurse education is the

most crucial component (Kikuchi & Suda, 2023).

The Average score of 12.16 in our study was lower than the finding of 13.86 Hannon's score in North West Ireland among nurses and midwives (Hannon & Murphy, 2007).

Most responders did not correctly answer the three (items 4, 14, and 19), which were statements about the effect of weight, physical exercise, and calcium intake during adolescence on osteoporosis; only 28.6% of respondents correctly answered 'False' to question 14 (Walking has a significant effect on bone health), suggesting that most student nurses are unaware that while walking has clear cardiovascular benefits, there is scant evidence to support its use in boosting bone density. The NIH Consensus Report (2001) found that walking has little impact on bone marrow density. This is explained by the fact that exercise and body weight-induced mechanical stress promote osteoblast activity, increasing bone mineral density ("National Institutes of Health Consensus Development Conference statement. Diagnosis and management of dental caries throughout life, March 26-28, 2001," 2001). In previous research employing the FOOQ, it was reported that the majority of physicians, who are a different type of healthcare practitioner from nurses, did not correctly respond to the statement in item 14 ("Walking has a significant impact on bone health") (Santos, Elliott-Sale, & Sale, 2017).

The correct answer to question 2 (High-impact exercise improves bone health) was given by just 51.6% of participants. Awareness of the promotion of regular exercise is necessary. Only 28.6% of participants correctly answered question 19 (Children 9–17 years of age get enough calcium from one glass of milk daily to

prevent osteoporosis), indicating that student nurses may not be aware of the amount of calcium in one glass of milk or the daily calcium intake for adolescents. It also emphasizes the need for more focus on the development of bone health during these formative years and for nurses to be informed that pediatric populations are where prevention efforts for osteoporosis should start.

Most participants (83.5%) knew there are several ways to prevent osteoporosis and that 20% of women over 50 may experience an osteoporotic fracture in their lifetime if no preventive measures are taken. Additionally, there was a sizable participant population (62.6%) that was aware that smoking raises the risk of osteoporosis. Moreover, 75.8% were aware that drinking alcohol increases the risk of osteoporosis, indicating that the participants had adequate knowledge of several significant risk factors and were aware of the importance of preventative actions. However, only 22% of respondents indicated that women with a lower body weight tend to have osteoporosis compared to heavier women (question 4), and 48.4% were aware that osteoporosis can be treated. This indicates that the participants are aware of the importance of prevention. This shows that focus needs to be put on the relationship between bone density and body mass index (BMI) in educational programs and that nurses' knowledge of osteoporosis treatment options needs to be updated more frequently.

This research has some limitations. The sample size for the present study was small. The population that was researched did not represent all Iraqi nursing students because it was a convenience sample. In addition, the



questionnaire did not allow subjects to elaborate on their views and answers. According to this study, participants needed additional knowledge about risk factors, including early menopause, low body weight, eating disorders, and alcoholism, as well as preventive actions like high-impact exercise. Nurses can create health education activities that effectively increase knowledge by considering these subjects.

### **CONCLUSIONS**

The results of this study suggest that nursing students at the University of Sulaimani may not have adequate knowledge of osteoporosis. There are considerable information gaps, particularly in prevention and treatment. I hope this study will bring attention to this underappreciated area of healthcare education and inspire initiatives to close knowledge gaps.

### **ETHICAL CONSIDERATIONS COMPLIANCE WITH ETHICAL GUIDELINES**

At the beginning of the interview and throughout the study, each student was informed about the study's purpose and benefits. Oral consent was obtained from each student before starting the data collection. Each student was informed that participation was voluntary, and each student had a choice to continue or withdraw from the study.

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### **AUTHOR'S CONTRIBUTIONS**

Study concept, Writing, and Reviewing the final edition by all authors.

### **DISCLOSURE STATEMENT:**

The authors report no conflict of interest.

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### References

- Ailinger, R. L., Lasus, H., & Braun, M. A. (2003). Revision of the Facts on Osteoporosis Quiz. *Nursing Research*, 52(3), 198-201. <https://doi.org/10.1097/00006199-200305000-00010>
- Brown, J. P. (2021). Long-term treatment of postmenopausal osteoporosis. *Endocrinology and Metabolism (Seoul)*, 36(3), 544-552. <https://doi.org/10.3803/EnM.2021.301>
- Camacho, P. M., Petak, S. M., Binkley, N., Diab, D. L., Eldeiry, L. S., Farooki, A., ... & Watts, N. B. (2020). American Association of Clinical Endocrinologists/American College of Endocrinology clinical practice guidelines for the diagnosis and treatment of postmenopausal osteoporosis—2020 update. *Endocrine Practice*, 26(Suppl 1), 1-46. <https://doi.org/10.4158/gl-2020-0524suppl>
- Cosman, F., Langdahl, B., & Leder, B. Z. (2024). Treatment sequence for osteoporosis. *Endocrine Practice*, 30(5), 490-496. <https://doi.org/10.1016/j.eprac.2024.01.014>
- Fischer, V., & Haffner-Luntzer, M. (2022). Interaction between bone and immune cells: Implications for

- postmenopausal osteoporosis. *Seminars in Cell & Developmental Biology*, 123, 14-21. <https://doi.org/10.1016/j.semcdb.2021.05.014>
- Hannon, C., & Murphy, K. (2007). A survey of nurses and midwives knowledge of risks and lifestyle factors associated with osteoporosis. *Journal of Orthopaedic Nursing*, 11, 30-37.
- Johnston, C. B., & Dagar, M. (2020). Osteoporosis in older adults. *Medical Clinics of North America*, 104(5), 873-884. <https://doi.org/10.1016/j.mcna.2020.06.004>
- Kikuchi, S., & Suda, Y. (2023). Admission screening form and osteoporosis educational appointment: A novel fracture liaison service system for identifying osteoporosis patients and facilitating medication initiation. *Archives of Osteoporosis*, 18(1), 117. <https://doi.org/10.1007/s11657-023-01326-7>
- Kobayakawa, T., Miyazaki, A., Saito, M., Suzuki, T., Takahashi, J., & Nakamura, Y. (2021). Denosumab versus romosozumab for postmenopausal osteoporosis treatment. *Scientific Reports*, 11(1), 11801. <https://doi.org/10.1038/s41598-021-91248-6>
- Management of postmenopausal osteoporosis: ACOG clinical practice guideline No. 2. (2022). *Obstetrics & Gynecology*, 139(4), 698-717. <https://doi.org/10.1097/aog.00000000000004730>
- McClung, M. R., & Clark, A. L. (2022). Osteoanabolic therapy for osteoporosis in women. *Climacteric*, 25(1), 60-66. <https://doi.org/10.1080/13697137.2021.1953463>
- National Institutes of Health Consensus Development Conference Statement. (2001). Diagnosis and management of dental caries throughout life, March 26-28, 2001. *Journal of the American Dental Association*, 132(8), 1153-1161. <https://doi.org/10.14219/jada.archive.2001.0343>
- Payer, J., Smaha, J., Kuřma, M., Killinger, Z., & Jackuliak, P. (2021). Osteoporosis in premenopausal women. *Vnitřní Lekarství*, 67(5), 284-290.
- Polyzos, S. A., Anastasilakis, A. D., Efstathiadou, Z. A., Yavropoulou, M. P., & Makras, P. (2021). Postmenopausal osteoporosis coexisting with other metabolic diseases: Treatment considerations. *Maturitas*, 147, 19-25. <https://doi.org/10.1016/j.maturitas.2021.02.007>
- Reid, I. R. (2020). A broader strategy for osteoporosis interventions. *Nature Reviews Endocrinology*, 16(6), 333-339. <https://doi.org/10.1038/s41574-020-0339-7>
- Ruiz-Esteves, K. N., Teysir, J., Schatoff, D., Yu, E. W., & Burnett-Bowie, S. M. (2022). Disparities in osteoporosis care among postmenopausal women in the United States. *Maturitas*, 156, 25-29.



<https://doi.org/10.1016/j.maturitas.2021.10.010>

Santos, L., Elliott-Sale, K. J., & Sale, C. (2017). Exercise and bone health across the lifespan. *Biogerontology*, 18(6), 931-946. <https://doi.org/10.1007/s10522-017-9732-6>

Walker, M. D., & Shane, E. (2023). Postmenopausal osteoporosis. *The New England Journal of Medicine*, 389(21), 1979-1991. <https://doi.org/10.1056/NEJMcp2307353>

Wan, Y., Zeng, F., Tan, H., Lu, Y., Zhang, Y., Zhao, L., & You, R. (2022). Cost-effectiveness analyses of denosumab for osteoporosis: A systematic review. *Osteoporosis International*, 33(5), 979-1015. <https://doi.org/10.1007/s00198-021-06268-9>