

# Evaluation of knowledge about osteoporosis risk factors among adults above 40 years of age in Hafar Al-Batin Region, Saudi Arabia

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## ABSTRACT

**Background:** Osteoporosis is a growing public health issue that is prevalent among the Saudi Arabian population. Several risk factors for the disease have been identified and could be modified using preventive strategies, including increasing awareness about the disease in susceptible individuals. **Methods:** A cross-sectional study was conducted using interview-based questionnaires to evaluate knowledge of osteoporosis risk factors in a sample of 513 Saudi participants attending primary health care centers (PHCCs) in the Hafar Al-Batin region, Saudi Arabia. The analysis was conducted using the Statistical Package of Social Sciences (SPSS) Version 21. **Findings:** A total of 513 participants were surveyed (78.8% female and 21.2% male). The study population had an overall good knowledge about osteoporosis risk factors. The analysis detected significant associations between the level of knowledge and the following parameters: sex, marital status, employment status, and education level ( $P < 0.05$ ). **Conclusions:** The majority of the study cohort had good knowledge of osteoporosis risk factors. The male participants had significantly more knowledge compared to females. Married people had better knowledge scores compared to unmarried ones. Employed and educated participants had significantly better knowledge compared to unemployed and those with an education level less than college. The involvement of primary health care utilizers by physicians and health authorities is highly recommended to increase awareness of osteoporosis.

**Keywords:** Knowledge, osteoporosis, risk factors, Saudi Arabia

## Introduction

Osteoporosis is a skeletal disease that is characterized by low bone mass and gradual weakening of bone microarchitecture. It causes bones to become porous and fragile, leading to an increased risk of fractures even with minor trauma.<sup>[1]</sup> Osteoporosis is a growing health issue that is associated with mortality and reduced quality of life,<sup>[2]</sup> and it has been recognized as the second most crucial health condition in the developed world following heart

diseases.<sup>[3]</sup> The lifetime risk for osteoporosis-related fractures among women is 30–50%.

As per the International Osteoporosis Foundation, around one in every ten women aged 60 years suffers from osteoporosis, which tends to affect as much as one in every five women at age 70 and two in every five women at age 80 with significant age-related risk in the men population.<sup>[4]</sup> In Saudi Arabia, 21% of men have osteoporosis,<sup>[5]</sup> and among women, the prevalence rate has been estimated to be 24% in the age group 50–59 years, 62% in the age group 50–69 years, and 74% in the age group 70–79 years.<sup>[6]</sup>

It is imperative to screen for potential knowledge gaps in the public understanding of osteoporosis, which may hinder the

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process of early prevention in susceptible societies. The Saudi Ministry of Health published a national strategy (2018) for osteoporosis prevention and management targeting primary health care providers and family physicians to improve the disease's early detection and treatment.<sup>[7]</sup> There is growing evidence that knowledge about osteoporosis affects preventive behavior in people with increased risk of the disease.<sup>[8,9]</sup> Despite these facts, several authors investigated the knowledge of osteoporosis and its risk in different countries and highlighted a lack of knowledge among the public and even medically-oriented populations.<sup>[10-14]</sup>

The diagnosis of osteoporosis is based on the presence of fragility fractures or bone mineral density (BMD) measured by dual-energy X-ray absorptiometry (DEXA). A T-score value of  $\leq -2.5$  is diagnostic of osteoporosis considering the local values of the reference population.<sup>[15]</sup> Non-pharmacological means, including lifestyle changes, medications, and prevention of falls, are usually the first-line approach for newly diagnosed patients with osteoporosis.<sup>[16]</sup> Research has highlighted several risk factors for osteoporosis; some of them are modifiable, and hence, are the target of preventive strategies. These risk factors include calcium and vitamin D deficiency, sedentary lifestyle, smoking, and obesity.<sup>[17,18]</sup> This study aims to evaluate the knowledge about osteoporosis risk factors among people over 40 years in the eastern province of Saudi Arabia.

## Materials and Methods

### Study design, settings, and population

This observational cross-sectional study was conducted between December 6 and December 24, 2020, and considered all individuals attending primary health care centers (PHCCs) in the Hafar Al-Batin region, the eastern province of Saudi Arabia. The study included Saudi male and female individuals who were 40 years old or above, ambulatory, able to understand the Arabic language, and willing to give consent to participate. We excluded patients with chronic diseases and those coming to the emergency department, patients aged below 15 or above 75 years, individuals with special needs, and those who were not willing to take part in the study. Incomplete questionnaires were also excluded.

The study was reviewed and approved by the National Committee of Bioethics (NCBF) at King Abdulaziz City for Science and Technology (KACST) No. 1005335 on 26/3/2021.

### Sample size and sampling procedures

Assuming an awareness rate of 50%, 95% confidence interval, 4% margin of error, and a total approximate population of 5,000,000 individuals, the minimum sample required was calculated to be 600. The sample was stratified to eight PHCCs in the region, with 75 participants from each center.

### Data collection and quality control

The directorate of health affairs in Hafar Al-Batin assigned a trained nurse from each center to collect data for this research.

The questionnaire was obtained from different studies in the literature about osteoporosis risk factors.<sup>[9]</sup> All individuals who gave verbal consent to participate in the current investigation were interviewed by the data collectors within 10–20 minutes, assuring complete confidentiality and anonymity of their responses.

The questionnaire included data regarding respondents' sex, age, marital status, education, etc., The main part of the questionnaire covered 10 common risk factors with possible answers of yes or no, stated in affirmative and negative sentences to avoid suggestive questions.

A score of 1 was given to each correct response, and a score of 0 was given to incorrect responses. The total knowledge score ranged from 0 to 10. To avoid arbitrary cut-off points, means and standard deviations were used to determine the knowledge level.

### Data management and analysis

The questionnaire papers were verified and entered at home and then merged into one device. Categorical variables were described by frequencies and percentages, while numerical variables were presented as a mean and standard deviation. The analysis of variance (ANOVA) and independent samples *t*-test were run to determine the differences between the means. The significance level was set at  $P < 0.05$ . The analysis was conducted using Statistical Package of Social Sciences (SPSS) Version 20 (SPSS Inc., Chicago, IL).

## Results

A total of 603 respondents agreed to participate in the current survey; 513 (85.1%) provided complete responses. The sample consisted of 266 (51.9%) participants aged between 40 and 50 years. There were 404 female respondents comprising 78.8% of the study sample. The majority (72.5%,  $n = 372$ ) of study population had no job and lacked formal education (53.2%,  $n = 273$ ). Table 1 lists the baseline characteristics of the sample.

Table 2 shows responses to questions assessing osteoporosis knowledge among the study group. Participants performed well in all items of osteoporosis risk factors except sex difference, as 155 (69.8%) participants incorrectly thought osteoporosis was more prevalent in the male population compared to the female [Table 2].

Questions regarding risk factors of osteoporosis were summed up to a total of 10 points, and mean scores were compared between different variables. As shown in Table 3, knowledge about osteoporosis differed between the study subgroups. These differences were statistically significant with respect to sex ( $P = .009$ ), marital status ( $P = .000$ ), employment ( $P = .001$ ), and education ( $P = 0.014$ ).

## Discussion

The study adds to the literature on osteoporosis in Saudi Arabia, highlighting relevant sociodemographic factors related to the basic public knowledge of osteoporosis. The present investigation's objective was to evaluate knowledge of osteoporosis risk factors in a sample of the general population of the eastern province of Saudi Arabia. The selection of the general population as study subjects is justified by the fact that they are understudied and may have knowledge gaps that, if addressed, would facilitate better prevention policies. Our analysis showed good knowledge about osteoporosis' common risk factors as the respondents scored 8.6 out of 10 on the knowledge questionnaire. Important correlates of the

participants' scores and their implications to osteoporosis prevention are discussed.

Previous research into knowledge and practice of osteoporosis risk factors among the general population revealed conflicting findings depending on the sociodemographic variables of the population under investigation.<sup>[19,20]</sup> In one review by Chin *et al.*,<sup>[12]</sup> 34 studies from around the world found a noticeable lack of knowledge of osteoporosis among young adults and adolescents. Even in populations that are hypothetically more likely to have good knowledge of osteoporosis, such as medical students, some authors reported under desired levels of osteoporosis-related knowledge.<sup>[13,14,21]</sup> Another study revealed a lack of awareness of osteoporosis among postmenopausal women—a specially important population with an increased risk of osteoporosis.<sup>[9]</sup> In this study, participants had adequate overall knowledge about specific risk and preventive factors of osteoporosis. This finding is consistent with the studies from the central and southern provinces of Saudi Arabia.<sup>[2,22]</sup> Some authors from Saudi Arabia demonstrated lower levels of awareness of the disease among middle-aged and older women.<sup>[23]</sup> This disparity in osteoporosis awareness could be attributed to the sampling characteristics and study design.

Osteoporosis is well-known to increase susceptibility to fractures and leads to more than 8.9 million fractures worldwide annually.<sup>[10]</sup> In this analysis, three-quarters of the respondents appreciated the relationship between osteoporosis and fractures. Similar percentages were reported in a study from southern India.<sup>[9]</sup> Knowledge about the risk of fracture in patients with osteoporosis is critical to disease prevention and may be associated with poor health outcomes in the affected patients.<sup>[24]</sup> It is noteworthy that one in four of our sample still ignore the fact that osteoporosis is a risk factor for fractures. This could be simply improved by efforts directed to public education.

One exception to the overall good osteoporosis knowledge in this study was the finding of 69.8% of the participants who agreed to the false statement that osteoporosis affects men more than women. In general, women are more prone to osteoporosis compared to men.<sup>[11]</sup> This is partially attributable to

Characteristics	Frequency	Percent
Age (years)		
40-50	266	51.9
51-60	163	31.8
61-70	82	16.0
Sex		
Male	109	21.2
Female	404	78.8
Marital status		
Married	434	84.6
Divorced/Widowed	68	13.3
Single	7	1.4
Employment		
Jobless	372	72.5
Works in health sector	11	2.1
Works in education sector	45	8.8
Works in military sector	36	7.0
Others	45	8.8
Education		
No formal education	273	53.2
Primary school	59	11.5
Intermediate school	30	5.8
High school	76	14.8
College and beyond	74	14.4
Awareness of osteoporosis		
Aware	72	14.0

**Table 2: Knowledge about osteoporosis risk factors (n=513)**

Statement	Correct answers	
	Frequency	Percent
Osteoporosis is linked to an increased risk of fractures	385	75.0
Osteoporosis affects men more than women	155	30.2
Osteoporosis is linked to low calcium levels	498	97.1
Osteoporosis is linked to low vitamin D levels	500	97.5
Reduced exposure to sunlight is a risk factor for osteoporosis	494	96.3
Hormone replacement therapy protects against osteoporosis	444	86.5
Menopause is a risk factor for osteoporosis	473	92.2
Osteoporosis is more common among people with increased weight	496	96.7
Use of cortisone can precipitate osteoporosis	479	93.4
Walking exercise is an important preventive factor for osteoporosis	494	96.3

**Table 3: Osteoporosis knowledge among different sample characteristics**

	Variable	Mean±SD	Sig. (two-tailed)
Sex	Male	8.8±1.4	0.009
	Female	8.5±0.4	
Marital status	Married	8.7±1.0	0.000
	Divorced/Widowed	8.1±2.2	
	Single	6.5±3.0	
Employment	Employed	8.9±0.5	0.001
	Not employed	8.5±1.5	
Education	No education	8.5±1.4	0.014
	Primary to high school	8.7±1.3	
	College and above	8.9±0.6	

the differences in BMD, bone size, and bone strength between men and women.<sup>[25]</sup> Although sex is an unpreventable risk factor for osteoporosis, knowledge about sex differences could help as a preventive measure of the disease in the more susceptible sex.

Calcium and vitamin D are important for bone strength as they shape the bone mineral matrix in the form of calcium phosphate. Vitamin D regulates calcium homeostasis. Adequate sunlight exposure is essential for the prevention and management of vitamin D deficiency.<sup>[17]</sup> These three principles of bone health were evaluated in the current study, and participants showed good awareness about their link to osteoporosis.

Postmenopausal women are especially at an increased risk of osteoporosis given the role of estrogen deficiency in bone loss. It is estimated that postmenopausal osteoporosis affects 200 million women worldwide; of them, 30–50% are predicted to have a clinical fracture.<sup>[26]</sup> Hormone replacement therapy is a rational and effective approach to osteoporosis among peri- and early postmenopausal women.<sup>[27]</sup> We found that most participants in this study were aware of the role of hormone replacement therapy (86.5%) and menopause in osteoporosis pathophysiology of osteoporosis (92.2%).

In this study, the male sex was associated with better knowledge about osteoporosis. Other studies reported conflicting findings. In a community-based study, Alamri *et al.*<sup>[28]</sup> found that women were more aware of osteoporosis-related knowledge and practice than did men. They explained this association by the fact that the women population may be more exposed to health education by care providers and, being at increased risk, may be the focus of osteoporosis awareness campaigns. However, another study on the general Iranian population found no sex difference in osteoporosis knowledge. The reason for such disparities is mainly methodological and is unlikely to be related to gender type *per se*.

In agreement with most previous works on osteoporosis awareness, education had a significant role in determining the level of knowledge among the study subjects. Compared with participants with an education level less than college ( $8.7 \pm 1.3$ ), those with college qualifications or more scored higher on the

knowledge questionnaire ( $8.9 \pm 0.6$ ). These findings support what has been found by previous works.<sup>[28-31]</sup> Education is well-known to affect cognition and health-seeking behaviors, and educated people are more likely to be health-oriented, have informed health-related behaviors, and have access to accurate health information.<sup>[28]</sup> Moreover, we found employed participants ( $8.9 \pm 0.5$ ) to be more knowledgeable than unemployed participants ( $8.5 \pm 1.5$ ). This is indirectly related to the education status as most educated people in Saudi Arabia are likely to be employed.

Even though our participants scored well on most questionnaire items, there still are some knowledge gaps to be improved, especially knowledge about sex differences in osteoporosis incidence. Better knowledge of the disease could be achieved through education programs directed to the public. Using the Health Belief Model, if individuals appreciated the likelihood of being affected by certain diseases, they will be more likely to adhere to preventive measures of these diseases. This applies well to osteoporosis as a prevalent condition among middle-aged and elderly Saudis. Reaching the public is now feasible at the lowest possible costs through the Internet and social media. We, therefore, suggest increasing the public awareness of osteoporosis risk factors using free online courses and other learning materials that are designed to be evidence-based and easily delivered to the general population.

### Limitations

The findings should be interpreted with caution, considering some limitations to the present study, namely the cross-sectional nature of study design and the use of a self-reported questionnaire. Using an interview-based study is advised in future studies aiming at a more detailed and objective overview of the subject.

### Conclusion

Overall, the findings of the current study demonstrated that the majority of the study subjects had good knowledge of osteoporosis. Some participants' characteristics, including male sex, marital status, education, and being employed, were found to be associated with better osteoporosis-related information. We encourage involving the public in health promotion programs and patient education, focusing on osteoporosis risk factors and prevention methods.

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### Conflicts of interest

There are no conflicts of interest.

### References

1. Kadam NS, Chiplonkar SA, Khadilkar A V, Khadilkar VV. Prevalence of osteoporosis in apparently healthy adults above 40 years of age in Pune City, India. *Indian J Endocrinol*



- Metab 2018;22:67-73.
2. Barzanji AT, Alamri FA, Mohamed AG. Osteoporosis: A study of knowledge, attitude and practice among adults in Riyadh, Saudi Arabia. *J Community Health* 2013;38:1098-105.
  3. Kanis JA. Assessment of osteoporosis at the primary health care level. *World Health* 2007;339. Available from: [http://www.shef.ac.uk/FRAX/pdfs/WHO\\_Technical\\_Report.pdf](http://www.shef.ac.uk/FRAX/pdfs/WHO_Technical_Report.pdf).
  4. International osteoporosis foundation (IOF). Osteoporosis facts and statistics Switzerland: International Osteoporosis Foundation; 2015 [Internet]. 2015. Available from: <http://www.iofbonehealth.org/facts-statistics#category-14>.
  5. El-Desouki MI, Sulimani RA. High prevalence of osteoporosis in Saudi men. *Saudi Med J* 2007;28:774-7.
  6. El-Desouki MI. Osteoporosis in postmenopausal Saudi women using dual x-ray bone densitometry. *Saudi Med J* 2003;24:953-6.
  7. Ministry of Health. National Plan for Osteoporosis Prevention and Management in the Kingdom of Saudi Arabia. [Internet]. 2018. Available from: <https://www.moh.gov.sa/en/Ministry/MediaCenter/Publications/Pages/Publications-2019-04-23-001.aspx>.
  8. Gopinathan NR, Sen RK, Behera P, Aggarwal S, Khandelwal N, Sen M. Awareness of osteoporosis in postmenopausal Indian women: An evaluation of Osteoporosis Health Belief Scale. *J Midlife Health* 7:180-4.
  9. Senthilraja M, Cherian K, Jebasingh F, Kapoor N, Paul T, Asha H. Osteoporosis knowledge and beliefs among postmenopausal women: A cross-sectional study from a teaching hospital in southern India. *J Fam Med Prim Care* 2019;8:1374.
  10. Hammoudeh S, Abdelrahman MH, Chandra P, Hammoudeh M. An assessment of patients' knowledge of osteoporosis in Qatar: A pilot study. *Qatar Med J* 2015;2015:13.
  11. Janiszewska M, Żołnierczuk-Kieliszek D, Kulik T, Dziedzic MA, Barańska A, Kryk A. Men's knowledge about osteoporosis and its risk factors. *Menopausal Rev* 2016;3:148-55.
  12. Chan C, Mohamed N, Ima-Nirwana S, Chin K-Y. A review of knowledge, belief and practice regarding osteoporosis among adolescents and young adults. *Int J Environ Res Public Health* 2018;15:1727.
  13. Ghaffari M, Nasirzadeh M, Rakhshanderou S, Hafezi Bakhtiari M, Harooni J. Osteoporosis-related knowledge among students of a medical sciences university in Iran: Calcium intake and physical activity. *J Med Life* 2015;8:203-8.
  14. Bilal M, Haseeb A, Merchant AZ, Rehman A, Arshad MH, Malik M, *et al.* Knowledge, beliefs and practices regarding osteoporosis among female medical school entrants in Pakistan. *Asia Pac Fam Med* 2017;16:6.
  15. Khaltaev N, Pflieger BA. On behalf of WHO, WHO Scientific Group on the Assessment of Osteoporosis at the Primary Health Care Level meeting. Summary Meeting Report, Brussels, Belgium, 5-7 May, 2004. Available from: <http://www.who.int/chp/topics/Osteoporosis.pdf>.
  16. Kanis JA, Melton LJ, Christiansen C, Johnston CC, Khaltaev N. The diagnosis of osteoporosis. *J Bone Miner Res* 1994;9:1137-41.
  17. Muñoz-Garach A, García-Fontana B, Muñoz-Torres M. Nutrients and dietary patterns related to osteoporosis. *Nutrients* 2020;12. doi: 10.3390/nu12071986.
  18. Ross PD. Osteoporosis. Frequency, consequences, and risk factors. *Arch Intern Med* 1996;156:1399-411.
  19. Bouvard B, Annweiler C, Legrand E. Osteoporosis in older adults. *Jt Bone Spine* 2021;88:105135. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1297319X21000075>.
  20. Al Hamam N, Al-Moaibed G, Alfayez E, Alfayez E, Al-Mubaddil M, Alramadhan N. Prevalence and risk factors for osteoporotic fracture among adults with comorbidities in Al-Ahsaa, Saudi Arabia. *J Fam Med Prim Care* 2020;9:877-82.
  21. Khired ZA, El-Akabawy G, Alosebail RA, Alotaibi AE, Alblowi NS, Alaradi HK, *et al.* Osteoporosis knowledge, attitudes, and practices among female Princess Nourah University students in Riyadh, Saudi Arabia. *Arch Osteoporos* 2021;16:1.
  22. Darout IA, Alamir A, Sultana S. Osteoporosis knowledge and related health behavior among women in Jazan Region, Kingdom of Saudi Arabia. *J Contemp Dent Pract* 2017;18:378-82.
  23. Al-Shahrani FM, Al-Zahrani AM, Al-Haqawi AI. Knowledge of osteoporosis in middle-aged and elderly women. *Saudi Med J* 2010;31:684-7.
  24. Sujic R, Gignac MA, Cockerill R, Beaton DE. Factors predictive of the perceived osteoporosis-fracture link in fragility fracture patients. *Maturitas* 2013;76:179-84.
  25. Cawthon PM. Gender differences in osteoporosis and fractures. *Clin Orthop Relat Res* 2011;469:1900-5.
  26. Johnell O, Kanis JA. An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int* 2006;17:1726-33.
  27. Gambacciani M, Levancini M. Featured Editorial Hormone replacement therapy and the prevention of postmenopausal osteoporosis. *Menopausal Rev* 2014;4:213-20.
  28. Alamri FA, Saeedi MY, Mohamed A, Barzanii A, Aldayel M, Ibrahim AK. Knowledge, attitude, and practice of osteoporosis among Saudis. *J Egypt Public Health Assoc* 2015;90:171-7.
  29. Al Attia HM, Abu Merhi AA, Al Farhan MM. How much do the Arab females know about osteoporosis? The scope and the sources of knowledge. *Clin Rheumatol* 2008;27:1167-70.
  30. Yu S, Huang Y-C. Knowledge of, attitudes toward, and activity to prevent osteoporosis among middle-aged and elderly women. *J Nurs Res* 2003;11:65-72.
  31. Bubshait D, Sadat-Ali M. Economic Implications of osteoporosis-related femoral fractures in Saudi Arabian society. *Calcif Tissue Int* 2007;81:455-8.