MEDICAL SCIENCE

To Cite:
AlHefdhi HA, Alshahrani MAA, Alalyani RTH, Alshamrani NSM, Alqathanin MAA, Asiri NAA, Alkedaisi NMJ, Alomari TKA. Assessment of osteoporosis knowledge among general population in Aseer region, Saudi Arabia. *Medical Science* 2023; 27: e333ms3129.
doi: https://doi.org/10.54905/disssi/v27i138/e333ms3129

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Peer-Review History
Received: 03 June 2023
Reviewed & Revised: 07/June/2023 to 31/July/2023
Accepted: 04 August 2023
Published: 14 August 2023

Peer-review Method
External peer-review was done through double-blind method.

Medical Science
pISSN 2321–7359; eISSN 2321–7367

DISCOVERY SCIENTIFIC SOCIETY

Assessment of osteoporosis knowledge among general population in Aseer region, Saudi Arabia

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ABSTRACT

Background: Osteoporosis is a significant global health issue characterized by reduced bone mass and deterioration of bone microarchitecture, resulting in a high incidence of fractures. Limited knowledge about osteoporosis contributes to adverse outcomes such as increased institutionalization, higher healthcare costs, and reduced quality of life. This research aimed to evaluate the awareness and knowledge of osteoporosis among the general population in the Aseer region of Saudi Arabia. *Methods:* The research employed a cross-sectional descriptive survey using a random sampling method. Data were collected through a web-based survey using "google forms" from participants in the Aseer province. *Results:* Most participants (67.3%) were females between the ages of 20 and 29. The majority (97.4%) were Saudi nationals (59.5%) with a bachelor's degree (63.4%). While many (35.3%) had a family history of osteoporosis, the majority (84.7%) had not been personally diagnosed with the condition. Participants demonstrated a relatively high level of knowledge about osteoporosis, identifying the disease, its effects on bones, and several risk factors. Knowledge levels varied according to occupation, family history, and personal osteoporosis diagnosis. To raise awareness among at-risk populations, targeted educational interventions are suggested. *Conclusion:* The study underscores the need for prioritizing osteoporosis education and awareness campaigns in the southern region of Saudi Arabia. Significant progress can be made in reducing the societal and individual burdens associated with this prevalent and debilitating disease by addressing the lack of knowledge surrounding osteoporosis. Efforts should be directed toward raising awareness among specific risk groups and undiagnosed individuals.

Keywords: Osteoporosis, Awareness, Knowledge, General population, Aseer region, Saudi Arabia.

1. INTRODUCTION

Osteoporosis is a chronic skeletal disorder marked by decreased bone density and structural deterioration, which increases the risk of fracture (Sözen et al., 2017). It is a major global health concern that affects both men and women, especially in aging populations. Pain, disability, decreased quality of life, and increased mortality rates can all result from osteoporotic fractures (Kanwal et al., 2017). Osteoporosis causes approximately nine million yearly fractures worldwide (Alqahtani and Alghamdi, 2021). Early in the millennium, reports indicated that the problem of osteoporosis in Saudi Arabia was more concerning than in the rest of the world.

According to preliminary findings, the prevalence of osteopenia could be as high as 48% (Sadat-Ali et al., 2022). Aging, excessive alcohol consumption, caffeine consumption, smoking, family history of osteoporotic fractures, immobilization, sedentary lifestyle, low calcium and vitamin D intake, and White or Asian race are all risk factors for osteoporosis (Alqahtani and Alghamdi, 2021). Public awareness and understanding of osteoporosis are critical in its prevention, early detection, and management. Individuals with adequate knowledge can make informed decisions about their bone health, take preventive measures, and seek appropriate medical care (Elnaem et al., 2017).

A cross-sectional study of adult female patients was conducted in Singapore in 2021 to evaluate factors associated with osteoporosis awareness and knowledge using the Osteoporosis Prevention and Awareness Tool (OPAAT). Most 410 patients (n = 362, 88.3%) had an OPAAT score of 24. Lower OPAAT scores were associated with lower education levels and diabetic patients. In 2020, 368 Chinese residents participated in another cross-sectional survey. 77% of individuals were aware of the osteoporosis definition, the diagnosis was 49.6%, risk factors were 49.2%, therapy was 60.5%, and prevention was 69.9%. The overall awareness rate was 67.8%.

A cross-sectional study on Australian women with premature ovarian insufficiency conducted in 2020 discovered that women living in rural areas had lower knowledge scores and were more likely to have a family history of osteoporosis than women living in metropolitan areas (Jones et al., 2020). Osteoporosis is a common and growing health problem among the Saudi population, resulting in a poor quality of life, and should therefore be considered a public health issue. Early detection and treatment are critical. Although numerous studies have been conducted to assess the level of knowledge and awareness of osteoporosis in various Saudi regions, to the best of our knowledge, no studies have been reported in the Aseer region, in Saudi Arabia's southwestern region.

As a result, this research aims to assess the general population's awareness and knowledge of osteoporosis in the Aseer region of Saudi Arabia. The study aims to identify knowledge gaps and areas for improvement by evaluating awareness, risk factors, prevention strategies, and available treatment options. The findings will be useful in developing targeted educational programs, public health campaigns, and interventions to increase osteoporosis awareness and prevention in the region.

2. METHODOLOGY

Study Design

A descriptive cross-sectional survey was used in this study, distributed between March 2023 until May 2023. This research was conducted in the Aseer province of Saudi Arabia's southwest region. A web-based survey via "google forms" was used to collect data from the general population. There were 600 participants in the study.

Inclusion Criteria

Saudi Arabian Aseer residents.

Exclusion Criteria

Saudi Arabia's general population outside of the Aseer region.

Sampling Techniques

A Simple random sampling method was used.

Data Management and Analysis Plan

The statistical analysis started by transferring the Excel spreadsheet to the SPSS software program. All variables were summarized and compared across the study groups. All categorical and interval variables were compared statistically across the study groups using the Chi-Square test. p-value of <0.05 was considered as significant.

3. RESULTS

A summary of the sociodemographic characteristics and osteoporosis status of the participants in the study is presented in Table 1, which provides an overview of the distribution of participants based on various factors, including age, gender, nationality, residency, marital status, education level, occupation, a history of osteoporosis in the family, and personal diagnosis of osteoporosis. The data provides valuable insights into the prevalence of osteoporosis among different demographic groups. In this study, the participants' characteristics and osteoporosis status were examined. The age groups of the participants were divided into four categories: 20-29 years (53.0%), over 40 years (19.7%), 30-39 years (16.1%), and below 20 years (11.2%). The gender distribution showed a higher representation of females (67.3%) than males (32.7%).

Most participants were Saudi nationals (97.4%), and all participants were residents of the southern region. In terms of marital status, most participants were single (59.5%), followed by married (36.6%), divorced (3.1%), and widowed (0.8%). Regarding education level, the majority had a bachelor's degree (63.4%), followed by high school or lower education (22.3%), diploma (9.4%), master's degree (3.1%), and doctoral degree (1.8%). The participants were engaged in various occupations, with students being the largest group (40.5%), followed by unemployed individuals (24.4%), those working in non-medical fields (23.6%), and those working in the medical field (11.4%).

Regarding osteoporosis status, 35.3% of participants reported a history of osteoporosis in their family, while 46.2% reported no family history, and 18.4% were unsure. The majority of participants (84.7%) had not been personally diagnosed with osteoporosis, while 9.6% confirmed a diagnosis, and 5.7% were uncertain. Among those diagnosed with osteoporosis, a small percentage had been diagnosed for over 5 years (4.9%), 4 to 5 years (1.8%), and within the past 3 years (3.9%), while the majority (89.4%) had not been diagnosed with osteoporosis.

Table 1 Participants' Sociodemographic Characteristics

		N	%
Age	< 20 years	43	11.2%
	From 20 to 29 years	204	53.0%
	From 30 to 39 years	62	16.1%
	> or = 40 years	76	19.7%
Gender	Female	259	67.3%
	Male	126	32.7%
Nationality	Non-Saudi	10	2.6%
	Saudi	375	97.4%
Resident of Southern Region	Yes	385	100.0%
Marital status	Single	229	59.5%
	Married	141	36.6%
	Divorced	12	3.1%
	Widowed	3	0.8%
Education level	High school and less	86	22.3%
	Diploma	36	9.4%
	Bachelor's degree	244	63.4%
	Master	12	3.1%
	Doctoral	7	1.8%
Occupation	Student	156	40.5%
	Unemployed	94	24.4%
	Work in the Medical field	44	11.4%
	Work in the Non-medical field	91	23.6%
Family History of Osteoporosis	No	178	46.2%
	Unsure	71	18.4%
	Yes	136	35.3%
Diagnosed with Osteoporosis	No	326	84.7%

	Unsure	22	5.7%
	Yes	37	9.6%
Duration of Diagnosis of Osteoporosis	>5 years	19	4.9%
	From 4 to 5 years	7	1.8%
	From now to 3 years	15	3.9%
	I have not been diagnosed with Osteoporosis	344	89.4%
Total		385	100.0%

The knowledge assessment on osteoporosis consisted of 33 questions, and the participants' responses are shown in Table 2. Overall, the participants demonstrated a relatively high level of knowledge, with the majority answering the questions correctly. The majority of participants correctly understood that osteoporosis is a disease of the bones (93.5%), weakens bones (95.6%), and increases the risk of fractures (96.4%). They also recognized that higher bone mass during childhood protects against osteoporosis (65.2%) and that aging increases the chances of developing the condition (86.0%). However, a significant proportion of participants were unaware of the importance of falls in causing fractures (75.3%).

Furthermore, many participants incorrectly believed that osteoporosis affects men and women equally (22.9%), while in reality, it predominantly affects women. They acknowledged that a history of osteoporosis in the family is a strong predisposing factor (56.4%), but incorrectly believed that people with white skin color are more susceptible to osteoporosis (76.1%). Participants understood that smoking (64.2%), lack of physical activity (79.5%), and avoiding milk or dairy products without calcium supplements (83.9%) increased the risk of osteoporosis. They were aware that tests of bone density are utilized during the diagnostic process (72.2%), but were less knowledgeable about certain aspects, such as not performing these tests after a bone fracture (18.2%), the frequency of bone density scans (27.3%), and the level of radiation exposure during measurement (14.8%).

Participants recognized various preventive measures, including adequate sun exposure (79.0%), alternative calcium sources like sardines and broccoli (70.4%), dietary regulation (84.4%), consuming dairy products (83.9%), and taking calcium and vitamin D supplements (85.2%). They also acknowledged the importance of regular exercise in preventing osteoporosis-related problems (85.2%). Some of the participants knew that early menopause (59.5%) and thyroid-related diseases (56.4%) increase the chances of developing osteoporosis, and nearly half were aware of the role of hormone therapy in preventing further bone loss (49.9%). However, many participants were unaware of the availability of effective treatments for osteoporosis in Saudi Arabia (26.8%).

Table 2 Response of the Participants to Questions Assessing Knowledge of Osteoporosis

	Incorrect Answer		Correct Answer	
	n	%	n	%
Osteoporosis is a disease of bones?	25	6.6%	360	93.5%
Osteoporosis makes bones weak and fragile (easy to break) and less dense?	17	4.4%	368	95.6%
Osteoporosis leads to an increased risk of bone fractures?	14	3.6%	371	96.4%
Higher bone mass during childhood gives protection against osteoporosis development?	134	34.8%	251	65.2%
Aging increases the chance of developing osteoporosis?	54	14.0%	331	86.0%
A fall is just as important as low bone strength in causing fractures?	95	24.7%	290	75.3%
Osteoporosis affects both men and women equally?	297	77.1%	88	22.9%
Family history of osteoporosis strongly predisposes a person to osteoporosis?	168	43.6%	217	56.4%
People with white skin color are more susceptible to osteoporosis than others?	293	76.1%	92	23.9%
Smoking increases the risk of developing osteoporosis?	138	35.8%	247	64.2%
Lack physical activity increases the risk of osteoporosis?	79	20.5%	306	79.5%
Avoiding milk or dairy products without taking calcium	62	16.1%	323	83.9%

supplements increases the chances developing of osteoporosis?				
Lack of adequate sun exposure may increase the chance of developing osteoporosis?	61	15.8%	324	84.2%
Drinking coffee and tea increases the risk of developing osteoporosis?	186	48.3%	199	51.7%
High salt (table salt) intake increases the risk of developing osteoporosis?	261	67.8%	124	32.2%
Drinking fizzy drinks increases the risk of developing osteoporosis?	86	22.3%	299	77.7%
In women, pregnancy increases the chances of developing osteoporosis?	354	91.9%	31	8.1%
Can women develop osteoporosis if me0pause occurs at an early age (before the age of 45)?	156	40.5%	229	59.5%
Thyroid problems increase osteoporosis risk?	168	43.6%	217	56.4
A bone density test is used to diag0se osteoporosis?	107	27.8%	278	72.2%
A bone density test is performed after a bone fracture?	315	81.8%	70	18.2%
A bone density scans are done monthly to monitor osteoporosis?	280	72.7%	105	27.3%
Radiation that measures bone density expose the patient to a high dose of radiation?	328	85.2%	57	14.8%
Exposure to sun light can prevent osteoporosis?	81	21.0%	304	79.0%
Sardines and broccoli are good sources of calcium for people who can0t take dairy products?	114	29.6%	271	70.4%
Regulating dietary habits has a role in preventing osteoporosis?	60	15.6%	325	84.4%
Having dairy products plays a role in preventing osteoporosis?	62	16.1%	323	83.9%
Calcium & amp; vitamin D supplements can prevent osteoporosis?	57	14.8%	328	85.2%

A comparison of knowledge regarding osteoporosis among participants based on various sociodemographic characteristics was conducted. The analysis includes descriptive statistics, one-way ANOVA, and post hoc Tukey's Honestly Significant Difference (HSD) test to identify significant differences in knowledge scores. The data from Table 3 highlights the mean scores, standard deviations, and statistical significance for each sociodemographic variable. The total mean knowledge score across all participants was 20.7, with a standard deviation of 5.6. There was a marginal difference in knowledge scores among different age groups, although it did not reach statistical significance ($F(3, 381) = 2.528$, $p = 0.057$). Specifically, participants aged 20 to 29 demonstrated the highest mean score (21.2), while those below 20 had the lowest mean score (18.7).

However, post hoc analyses were not performed for this variable. There was found to be no statistically significant difference in the levels of knowledge between male ($M = 20.1$) and female ($M = 21.0$) participants ($F(1, 383) = 2.178$, $p = 0.141$). Knowledge scores did not significantly differ between Saudi ($M = 20.7$) and non-Saudi ($M = 19.7$) participants ($F(1, 383) = 0.305$, $p = 0.581$). There was no significant difference in knowledge scores among different marital status groups ($F(3, 381) = 0.426$, $p = 0.734$). However, post hoc analyses were not performed for this variable. The knowledge scores did not significantly vary across different education levels ($F(4, 380) = 0.770$, $p = 0.545$).

Nonetheless, participants with a master's degree ($M = 23.3$) exhibited the highest mean score, while those with a doctoral degree ($M = 19.4$) had the lowest mean score. Post hoc analyses were not conducted for this variable. A significant difference was observed in knowledge scores across various occupations ($F(3, 381) = 7.028$, $p < 0.001$). Post hoc analyses using Tukey's HSD test revealed that participants working in the medical field ($M = 23.9$) had significantly higher knowledge scores compared to students ($M = 20.9$), unemployed individuals ($M = 20.0$), and those working in non-medical fields ($M = 19.4$).

The presence of a history of osteoporosis in the family significantly influenced knowledge scores ($F(2, 382) = 4.439$, $p = 0.012$). Post hoc analyses revealed that participants with a family history ($M = 21.6$) had higher knowledge scores than those who were unsure ($M = 19.1$). Knowledge scores varied significantly based on the diagnosis of osteoporosis ($F(2, 382) = 7.725$, $p < 0.001$). Post hoc analyses showed that participants with a diagnosis ($M = 20.9$) or without a diagnosis ($M = 20.9$) had higher knowledge scores compared to those who were unsure about their diagnosis ($M = 16.2$). The duration of osteoporosis diagnosis did not significantly affect knowledge scores ($F(2, 381) = 0.228$, $p = 0.877$).

Table 3 Comparison of Knowledge of Osteoporosis between participants of different sociodemographic characteristics

		Total Score		
		Mean	Standard Deviation	P value
Age	< 20 years	18.7	5.9	0.057
	From 20 to 29 years	21.2	5.6	
	From 30 to 39 years	20.3	5.3	
	> or = 40 years	20.6	5.7	
Gender	Female	21.0	5.6	0.141
	Male	20.1	5.5	
Nationality	Non-Saudi	19.7	6.8	0.581
	Saudi	20.7	5.6	
Marital status	Single	20.6	5.7	0.734
	Married	20.6	5.5	
	Divorced	21.7	5.2	
	Widowed	23.7	1.5	
Education level	High school and less	20.4	5.4	0.545
	Diploma	20.6	5.9	
	Bachelor's degree	20.7	5.7	
	Master	23.3	2.6	
	Doctoral	19.4	7.2	
Occupation	Student	20.9	5.9	<0.001*
	Unemployed	20.0	5.7	
	Work in the Medical field	23.9	3.7	
	Work in the Non-medical field	19.4	5.3	
Family History of Osteoporosis	No	20.6	5.3	0.012*
	Yes	21.6	5.3	
	Unsure	19.1	6.6	
Diagnosed with Osteoporosis	No	20.9	5.3	<0.001*
	Yes	20.9	4.8	
	Unsure	16.2	8.4	
Duration of Diagnosis of Osteoporosis	I have not been diagnosed with osteoporosis	20.6	5.7	0.877
	From now to 3 years	21.1	4.8	
	From 4 to 5 years	22.3	4.5	
	>5 years	20.7	5.8	
Overall Score		20.7	5.6	

AOne-Way ANOVA *p<0.05, Significant

4. DISCUSSION

The sociodemographic characteristics of the participants in this study provide valuable insights into the prevalence of osteoporosis among different demographic groups. Age was found to be an important factor in relation to osteoporosis prevalence. Most participants were 20 to 29 years old, which suggests that this group constitutes a significant proportion of the study population. The study's focus may explain the result on a specific age group or the relatively younger age distribution of the population in the southern region. The gender distribution among the participants revealed a higher representation of females than males. This aligns with existing literature that highlights the higher susceptibility of females to osteoporosis due to factors such as hormonal changes during menopause and lower peak bone mass compared to males (Ji and Yu, 2015).

The nationality of the participants showed a predominantly Saudi population, which is expected given the study's location in the southern region. This localized investigation included just southern residents. Expanding the study to include participants from other regions would enlighten osteoporosis prevalence across the entire country. Marital status and education level were important sociodemographic factors in this study. The majority of participants were single, and the most common education level was a bachelor's degree. These findings suggest that targeting educational interventions towards singles and individuals with lower education levels may be beneficial in raising awareness about osteoporosis and promoting preventive behaviors.

The occupational distribution of the participants revealed that a significant proportion were students, followed by unemployed individuals. This highlights the need to implement educational programs in schools and universities to promote bone health awareness among young individuals. Regarding osteoporosis status, a substantial percentage of participants reported a family history of osteoporosis. This finding aligns with the known genetic component of osteoporosis, emphasizing the importance of family history assessment in identifying individuals at higher risk (Gasparik et al., 2021). Participants with a history of osteoporosis in the family should be targeted for early screening and preventive measures.

The majority of participants reported no personal diagnosis of osteoporosis. This indicates a potential gap in diagnosis and highlights the under diagnosis of osteoporosis in the study population. Among those diagnosed with osteoporosis, only a small percentage reported a diagnosis duration of more than five years, indicating that the majority of diagnoses were relatively recent. Early diagnosis allows for timely intervention, including lifestyle modifications and pharmacological treatments, which can help slow down the progression of osteoporosis and reduce the risk of fractures. Our study assessed the knowledge about osteoporosis among the participants. The results of the study revealed that the majority of the participants had a good understanding of osteoporosis, as they provided correct answers for most of the questions assessing their knowledge.

Notably, the participants correctly identified osteoporosis as a disease of the bones, characterized by weakened and fragile bones with reduced density. They were also aware that osteoporosis increases the risk of bone fractures, emphasizing the importance of bone strength in preventing fractures. The participants acknowledged the significance of higher bone mass during childhood as a protective factor against osteoporosis development, reinforcing the importance of bone health in early life stages. Furthermore, the study participants showed comprehension of aging on the likelihood of developing osteoporosis. They recognized that both men and women can be affected by osteoporosis, although women are at a higher risk. The participants also correctly identified several risk factors that can be modified, such as smoking, lack of physical activity, inadequate sun exposure, and excessive consumption of certain substances like coffee, tea, and fizzy drinks, which can increase the chances of developing osteoporosis.

It is encouraging to note that the participants knew about osteoporosis preventive measures. They recognized the importance of calcium intake through dairy products or suitable alternatives, such as calcium supplements and non-dairy sources like sardines and broccoli. Participants also knew that regular exercise and hormone therapy decreases bone loss and fractures. However, it is important to note that despite the overall satisfactory level of knowledge observed in this study, there were still some misconceptions among the participants. For instance, a few participants mistakenly believed that osteoporosis affects both men and women equally and that pregnancy increases the chances of developing osteoporosis in women. These misconceptions indicate areas where targeted educational interventions could be beneficial to improve understanding further and dispel misinformation.

It can be observed that this study's participants showed a relatively high level of knowledge regarding osteoporosis. One key finding of this study is that participants had a strong understanding of osteoporosis as a disease of the bones, with 93.5% correctly identifying it as such. This aligns with existing knowledge about the basic nature of osteoporosis and indicates that participants had a fundamental grasp of the condition (Marcus et al., 2013; Föger-Samwald et al., 2020). Participants also demonstrated a good understanding of the effects of osteoporosis on bones, with 95.6% recognizing that it makes bones weak and fragile and 96.4% acknowledging the increased risk of bone fractures associated with the condition. These findings highlight the participants' awareness of the primary consequences of osteoporosis and the importance of addressing bone health to prevent fractures (Bussell, 2021).

Regarding risk factors, most participants recognized that higher bone mass during childhood protects against osteoporosis (65.2%) and that aging increases the chance of developing the condition (86.0%). However, a significant proportion of participants were unaware of the importance of falls in causing fractures (75.3%). This finding suggests a potential gap in understanding regarding the role of falls in the context of osteoporosis prevention and fracture risk reduction. Regarding gender differences, it was observed that most participants incorrectly believed that osteoporosis affects men and women equally (22.9%). In reality, osteoporosis predominantly affects women (Keen and Reddivari, 2023).

This misconception highlights the need for targeted educational interventions to correct such misconceptions and raise awareness about the gender-specific aspects of osteoporosis. Regarding genetic and ethnic factors, participants recognized that a history of osteoporosis in the family strongly predisposes individuals to the condition (56.4%). However, the belief that people with white skin color are more susceptible to osteoporosis was incorrect for the majority of participants (76.1%). These findings suggest the importance of providing accurate information about the impact of genetics and ethnicity on osteoporosis risk to dispel misconceptions and improve the disease understanding.

Participants generally acknowledged the impact of various lifestyle factors on osteoporosis risk. They recognized that smoking (64.2%), lack of physical activity (79.5%), and avoiding milk or dairy products without calcium supplements (83.9%) increase the likelihood of developing osteoporosis. They also acknowledged the association of adequate sun exposure (84.2%) and the consumption of coffee and tea (51.7%) with higher risks. These findings underscore the participants' awareness of the lifestyle choices that can lead to osteoporosis development and highlight the importance of promoting healthy behaviors to prevent the condition. Regarding diagnostic and preventive measures, participants demonstrated a reasonable level of awareness that bone density tests are used to diagnose osteoporosis (72.2%).

However, there were some misconceptions, such as the belief that bone density tests are performed after a bone fracture (18.2%) or on a monthly basis (27.3%). Additionally, a significant proportion of participants were unaware that the radiation exposure during bone density measurement is not high (14.8%). These findings suggest the need for further education on the appropriate use of diagnostic tests and dispelling concerns related to radiation exposure. In terms of prevention and treatment, participants generally recognized the importance of various measures such as exposure to sunlight (79.0%), sardines and broccoli as alternative calcium sources (70.4%), regulating dietary habits (84.4%), consuming dairy products (83.9%), and taking calcium and vitamin D supplements (85.2%).

Participants also acknowledged the importance of regular exercise in preventing problems related to osteoporosis (85.2%). These findings indicate a good understanding of the role of lifestyle modifications and preventive measures in managing osteoporosis (Pai, 2017; Christianson and Shen, 2013). Regarding hormonal and medical interventions, approximately half of the participants were aware that early menopause can lead to osteoporosis (59.5%) and that thyroid-related diseases increase the chances of developing the condition (56.4%). Participants also recognized the role of hormone therapy in preventing further bone loss (49.9%). These findings suggest a moderate level of awareness regarding the impact of hormonal factors and medical interventions on osteoporosis.

One notable finding of this study is that participants were largely unaware of the availability of effective treatments for osteoporosis in Saudi Arabia (26.8%). This finding raises concerns about the dissemination of information regarding treatment options and highlights the need for improved patient education and access to healthcare resources. Our study also examined the association between knowledge regarding osteoporosis and various sociodemographic characteristics among the participants. Overall, the participants in this study exhibited a moderate level of knowledge about osteoporosis, with a mean knowledge score of 20.7 and a standard deviation of 5.6. Regarding age, although there was a marginal difference in knowledge scores among different age groups, it did not reach statistical significance.

Interestingly, participants aged 20 to 29 years had the highest mean score, while those below 20 years had the lowest mean score. This suggests that younger individuals may have a slightly better understanding of osteoporosis. In terms of gender, no statistically significant difference was found in knowledge scores between male and female participants. This implies that both genders had a similar level of knowledge about osteoporosis. These results align with a study conducted by Gammage et al., (2012), which also reported no gender differences in osteoporosis knowledge among their participants. Examining nationality, the study found no significant difference in knowledge scores between Saudi and non-Saudi participants. This suggests that the participants' nationality did not influence their knowledge about osteoporosis (Wright et al., 2019).

Regarding marital status, no significant difference was observed in knowledge scores among different marital status groups. This implies that being married or unmarried did not impact the participants' knowledge about osteoporosis. Analyzing education level, the study found no significant variation in knowledge scores across different education levels. Although participants with a master's degree exhibited the highest mean score, and those with a doctoral degree had the lowest mean score, these differences were not statistically significant. Etemadifar et al., (2013) found similar results, which reported no significant association between education level and osteoporosis knowledge.

Occupation emerged as a significant predictor of osteoporosis knowledge in this study. Participants working in the medical field had higher knowledge scores compared to students, unemployed individuals, and those working in non-medical fields. This finding suggests that individuals with a medical background may possess greater knowledge about osteoporosis due to their

professional exposure and training. Similar results were reported in a study by Nguyen, (2016), which demonstrated that healthcare professionals had superior osteoporosis knowledge against the general population. The presence of a history of osteoporosis in the family significantly influenced knowledge scores, with participants having a family history demonstrating higher knowledge scores compared to those who were unsure about their family history.

This indicates that personal experiences with osteoporosis within the family may motivate individuals to learn more about the condition. These findings align with a study by Al-Otaibi, (2015), which reported a positive association between family history and osteoporosis knowledge. Furthermore, the diagnosis of osteoporosis had an impact on knowledge scores. Participants who had received a diagnosis of osteoporosis and those who were uncertain about their diagnosis exhibited higher knowledge scores than those without a diagnosis. This suggests that individuals diagnosed with osteoporosis or uncertain about their diagnosis may seek information to understand the condition better.

These results are consistent with the study conducted by Al-Rashidy, (2021), which also found that participants with a diagnosis had higher osteoporosis knowledge compared to those without a diagnosis. Finally, the duration of osteoporosis diagnosis did not significantly affect knowledge scores in this study. This implies that the length of time since receiving an osteoporosis diagnosis did not influence participants' knowledge about the condition. It is worth noting that the duration categories used in this study may not have captured the nuances of how knowledge evolves over time after diagnosis.

5. CONCLUSION

This study underscores the importance of prioritizing osteoporosis education and awareness campaigns in southern Saudi Arabia. Efforts should focus on increasing knowledge among individuals with specific risk factors and those not yet diagnosed with the condition. By addressing the lack of knowledge surrounding osteoporosis, we can significantly reduce the societal and individual burdens associated with this prevalent and debilitating disease.

Acknowledgement

We thank the participants who were all contributed samples to the study.

Author Contributions

Hayfa Abdulkhaleq AlHefdhi: Conceptualization, data collection, analysis, writing - original draft
Mohammed Abdullah Aoun Alshahrani: Conceptualization, data analysis, writing - review & editing
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Nouf Ali Abdullah Asiri: Conceptualization, data analysis, writing - review & editing
Njoud Moghram Jaber Alkedaisi: Data collection, methodology, writing - review & editing
Tahani Khalaf Abdullah Alomari: Project administration, conceptualization, writing - review & editing

Ethical approval

The study was approved by the Research Ethical Committee of King Khalid University (KKU), Abha, Saudi Arabia [(ECM#2023-1406) – (HAPO-06-B-001)].

Informed consent

Written informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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