

# Awareness of Osteoporosis among the General Population of the Aseer Region, Saudi Arabia

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## ABSTRACT

**Background:** Osteoporosis is a bone disorder related to low bone density, which mainly affects women during menopause. Osteoporosis has a variety of symptoms, including bone ache and fracture, which may affect the patients' quality of life. Greater public awareness of the nature, risks, and protective factors of osteoporosis may help to reduce the sequelae related to this disorder.

**Objective:** This study was aimed to assess awareness of the disease in Aseer region, Saudi Arabia.

**Methodology:** A cross-sectional survey was conducted on the general population in the Aseer region of southwest Saudi Arabia from June to August 2016. Consecutive participants were interviewed using a self-administered questionnaire.

**Results:** Our study included 1,066 participants, comprising 550 men (51.6%) and 516 women (48.4%), of whom 39.5% were < 30 years old and 7.5% were > 50 years old. Overall, 80.4% of the participants had good knowledge of the consequences of osteoporosis (knowledge score > 60% of the total), 44.7% had good general knowledge regarding osteoporosis, and 33.8% had good knowledge of the risk and protective factors; generally, 36.9% of the study sample had good knowledge of osteoporosis.

**Conclusions and Recommendations:** Our findings indicated that individuals had a strong awareness of some aspects of osteoporosis, especially the consequences, as one out of three participants were aware of the general aspects of this disorder.

**Keywords:** OKAT, Awareness, Osteoporosis, Cross section, General population, Asser, Saudi Arabia

## INTRODUCTION

Osteoporosis is a disorder that causes bone weakness and an increased risk of fractures, and represents a leading cause of fractures in the elderly population. [1] Osteoporosis is a Greek word for "porous bones"<sup>1</sup>. It occurs when there is a lower than normal bone mass or excessive bone loss<sup>2,3</sup>. The incidence of osteoporosis increases with age<sup>3</sup>, and approximately 15% of whites in their 50s, and 70% of those > 80 will be affected by osteoporosis<sup>4</sup>. Osteoporosis is more prevalent in women<sup>3</sup>, with approximately 9%–38% of women afflicted in the developed world compared to approximately 2%–8% of men.

The incidence of osteoporosis in the developing world is unclear<sup>5</sup>. In 2010, osteoporosis was reported to affect 22 million women and 5.5 million men in Europe<sup>6</sup>; in the same year, it affected 8 million women and 1–2 million men in the United States<sup>4,7</sup>. White people have a greater risk of osteoporosis<sup>3</sup>.

Bone mass density (BMD) is defined as the amount of bone present in

the skeleton. In general, a higher bone density results in stronger bones. Bone density is affected to a large degree by genetic factors, which can be affected by environmental factors and medicines<sup>1,8-10</sup>. Bone density increases during childhood and reaches its maximum at 25 years, where it remains consistent for approximately 10 years. As a result of the aging process, both males and females will lose approximately 0.3% to 0.5% of their bone density annually<sup>9-11</sup>.

Many studies have focused on risk factors of osteoporosis among men and women and have reported greater loss of BMD in women compared to men at an average of 4 years. However, BMD reduces with age in both sexes. In women, although weight loss and alcohol consumption are associated with the loss of BMD, those women who gained weight during the intermediate period i.e. the period of life between the beginnings of the menstrual cycle to menopause, increased their BMD or their BMD changed little. In men, weight loss and weight reduction are associated with loss of BMD. Smoking cigarettes is also associated with a loss of BMD at the trochanter site in men, while

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caffeine intake, low serum vitamin D 25-OH levels, low calcium levels, and lower physical activity are not associated with BMD loss. The risk factors for bone loss among older adults were found to be women, low body weight, and weight loss, while weight gain seems to protect both men and women from bone loss<sup>12-15</sup>.

A study in Saudi Arabia revealed that in a population ranging from 50–79 years of age, 34% of women and 30.7% of men were osteoporotic<sup>16</sup>. The life expectancy among Saudis increased from 45–67 years in 1960 to 75.7 years in 2013<sup>17</sup>. The incidence of osteoporosis is expected to increase in Saudi Arabia in the coming years due to increased life expectancy.

Knowledge and awareness of osteoporosis and its associated risk factors plays a major role in preventing osteoporosis. There are limited data on the public awareness of osteoporosis in Aseer, southwestern Saudi Arabia. Therefore, this study was designed to assess awareness of the disease in this area.

## METHODOLOGY

This study targeted the general population in the Aseer region and was conducted between June 2016 and August 2016. This region takes its name from the Aseer tribe that dominates the area (approximately 81,000 km<sup>2</sup>), with an estimated population of 2,190,000. The Aseer region is situated in the southwestern region of Saudi Arabia. A cross-sectional survey was performed with 1,066 participants (550 men and 516 women), with ages ranging from 15–75 years. The participants were selected from the largest malls in different districts of the largest towns (Abha, Khamis Mushait, and Jazan) in the Aseer region. All accessible individuals who agreed to participate were interviewed by the authors using a self-administered questionnaire. Informed consent was obtained from each participant. The information obtained from the respondents included their bio-data, social data, and awareness regarding osteoporosis. The osteoporosis knowledge was assessed using the Arabic version of the Osteoporosis Knowledge Assessment Tool (OKAT)<sup>18</sup>. A pilot study on 75 individuals was conducted to test for the applicability and reliability of the OKAT, based on an internal consistency coefficient Cronbach's- $\alpha$  that ranged from 0.79 for the Osteoporosis Consequences domain to 0.86 for Risk/protective factors. The validity of the content was tested based on a consensus and review of the tool by three experts, and any suggested modifications were performed. Ethics approval was obtained from the College of Medicine Ethical Committee of King Khalid University dated November 19th, 2015.

## STATISTICAL ANALYSIS

Data were collected, coded, and entered into SPSS statistical software version 22 (IBM Corp., Armonk, NY, USA). The graphs were plotted using Excel software (Microsoft Corp., Redmond, WA, USA). All statistical analyses were performed using two-tailed tests with an alpha error of 0.05. Statistical significance was set at  $P < 0.05$ .

Each correct answer for the awareness item was recorded as a score of 1 point; otherwise, 0 was recorded. The item discrete scores for awareness were summed, and the total score was calculated by summing the scores given for the responses. All scores were transformed into percent values, as follows:  $\text{Score \%} = (\text{observed score}/\text{maximum score}) \times 100$ .

Then, the score % for perception at different domains was transferred into categories according to the different scales as follows: Poor awareness if the % score was  $< 60\%$ , and good awareness if the %

score was  $\geq 60\%$ . Descriptive statistics: Frequencies and percentages were used to describe the frequency of each category for categorical data. The mean and standard deviation were used to describe the scale data. Chi-square test, Monte Carlo exact test, and Fisher's exact test were used to test for an association between the awareness level and sample characteristics if there were many small, expected values.

## RESULTS

In the entire study sample, 39.5% of the participants were  $< 30$  years of age and 7.5% were  $> 50$  years old. Approximately one-third (31.1%) of the study sample were unmarried, and 67.3% were married. The majority of the participants (68.6%) had graduated from the university, 35.2% had a monthly income of  $< 5,000$  SR, and approximately 17% had a monthly income  $> 15,000$  SR. Overall, 22.3% of the participants worked as teachers, 20.1% worked in civil jobs, and 18.7% were students. Approximately 49% of the participants were exposed to sun 1–3 times weekly, and sun exposure was much lower in 20.8% of participants (Table 1).

**Table 1: Participants' Characteristics**

Socio-demographic data	No	%	
Age (years)	< 30 years	421	39.5%
	30–	351	32.9%
	40–	214	20.1%
	50+	80	7.5%
Sex	Male	550	51.6%
	Female	516	48.4%
Marital status	Single	331	31.1%
	Married	717	67.3%
	Widow/separated	18	1.7%
Level of education	Elementary	18	1.7%
	Intermediate	53	5.0%
	Secondary	173	16.2%
	University	731	68.6%
Monthly income (SR)	Post-university	91	8.5%
	< 5,000	375	35.2%
	50,001–10,000	271	25.4%
	10,001–15,000	232	21.8%
	15,001–20,000	115	10.8%
Job	> 20,000	73	6.8%
	Student	199	18.7%
	Teacher	238	22.3%
	Solider	75	7.0%
	Civil clerk	214	20.1%
	Private work	94	8.8%
	Retired	42	3.9%
	Jobless/housewife	204	19.1%
Sun exposure per week (hours)	No exposure	222	20.8%
	1–3	519	48.7%
	4–7	157	14.7%
	8+	168	15.8%

Table 2 presents the participants' knowledge regarding different aspects of osteoporosis. Regarding general knowledge, 79.5% of the participants knew about the age of osteoporosis among females, and 56.7% knew whether they were at risk for osteoporosis. Only 9.0% of the participants were aware of the age at which osteoporosis becomes a risk among males. Considering the awareness of risk and protective factors, 72.5% of the participants knew that calcium intake can protect

against osteoporosis, and 71.6% knew about alternatives for those who could not have dairy products to reduce the risk of osteoporosis. Additionally, approximately 70% of the sampled population knew the importance of physical activity in delaying osteoporosis, while only 31.1% of these individuals knew about bone loss prevention and the role of alcohol in osteoporosis. With regard to awareness of the consequences of osteoporosis, 90% of the sample population knew that osteoporosis can cause bone fracture, and 69.4% knew the symptoms of osteoporosis.

Generally, 80.4% of the interviewed individuals had good knowledge of the consequences of osteoporosis (knowledge score > 60% of the total), 44.7% had good general knowledge of osteoporosis, and 33.8% had good knowledge of the risk and protective factors; generally, 36.9% of the participants had good knowledge of osteoporosis (Figure 1).

Table 3 presents the knowledge level of osteoporosis based on the sample characteristics. Increased age was significantly associated with increased knowledge of osteoporosis (P = 0.003), and females had significantly higher knowledge than males (39.5% vs. 34.4%) (P < 0.05). Half of the participants with elementary education had a good knowledge level of osteoporosis compared to 44.5% of those with

secondary education and 34.5% of university graduates (P = 0.108). None of the other factors were significantly related to an individual's knowledge level of osteoporosis.

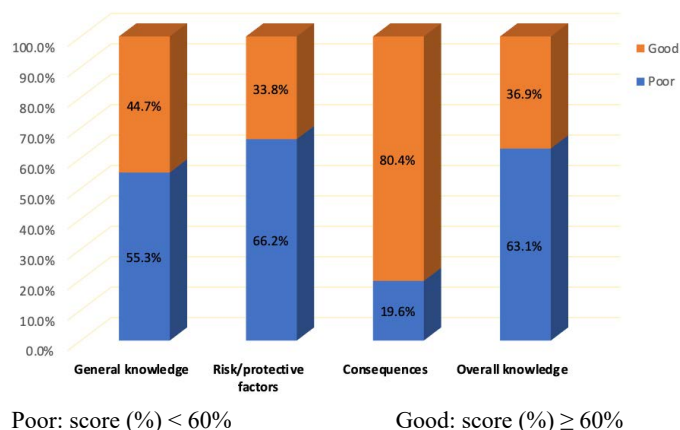


Figure 1: Level of osteoporosis knowledge domains

Table 2: Distribution of osteoporosis knowledge domains

Domain	Item	True		False		Don't know	
		No	%	No	%	No	%
General knowledge	White women have the highest risk of fracture compared to other races	483	45.3%	149	14.0%	434	40.7%
	Having a higher peak bone mass at the end of childhood gives no protection against the development of osteoporosis in later life	472	44.3%	188	17.6%	406	38.1%
	Osteoporosis is more common in men	96	9.0%	726	68.1%	244	22.9%
	By age 80, the majority of women have osteoporosis	847	79.5%	67	6.3%	152	14.3%
	From age 50, most women can expect at least one fracture before they die	492	46.2%	235	22.0%	339	31.8%
	It is easy to tell whether I am at risk of osteoporosis by my clinical risk factors	604	56.7%	215	20.2%	247	23.2%
	There is minimal bone loss in the 10 years following the onset of menopause	514	48.2%	104	9.8%	448	42.0%
Risk/protective factors	There are no effective treatments for osteoporosis available in Saudi Arabia	337	31.6%	307	28.8%	422	39.6%
	Cigarette smoking can contribute to osteoporosis	690	64.7%	101	9.5%	275	25.8%
	Any type of physical activity is beneficial for osteoporosis	734	68.9%	167	15.7%	165	15.5%
	Family history of osteoporosis strongly predisposes a person to osteoporosis	595	55.8%	175	16.4%	296	27.8%
	An adequate calcium intake can be achieved from two glasses of milk a day	773	72.5%	140	13.1%	153	14.4%
	Sardines and broccoli are good sources of calcium for people who cannot take dairy products	763	71.6%	36	3.4%	267	25.0%
	Calcium supplements alone can prevent bone loss	332	31.1%	464	43.5%	270	25.3%
	Alcohol in moderation has little effect on osteoporosis	356	33.4%	381	35.7%	329	30.9%
Consequences	A high salt intake is a risk factor for osteoporosis	451	42.3%	160	15.0%	455	42.7%
	Hormone therapy prevents further bone loss at any age after menopause	408	38.3%	136	12.8%	522	49.0%
	Osteoporosis leads to an increased risk of bone fractures	959	90.0%	15	1.4%	92	8.6%
	Osteoporosis usually causes symptoms (e.g., pain) before fractures occur	740	69.4%	78	7.3%	248	23.3%
	A fall is just as important as low bone strength in causing fractures	609	57.1%	190	17.8%	267	25.0%

**Table 3: Distribution of the overall knowledge of osteoporosis by the socio-demographic characteristics**

Factors	Overall knowledge				P	
	Poor		Good			
	No	%	No	%		
Age (years)	< 30 years	286	67.9%	135	32.1%	0.003*
	30–	227	64.7%	124	35.3%	
	40–	118	55.1%	96	44.9%	
	50+	42	52.5%	38	47.5%	
Sex	Male	361	65.6%	189	34.4%	0.050*
	Female	312	60.5%	204	39.5%	
Marital status	Single	220	66.5%	111	33.5%	0.318
	Married	442	61.6%	275	38.4%	
	Widow/separated	11	61.1%	7	38.9%	
Level of education	Elementary	9	50.0%	9	50.0%	0.108
	Intermediate	33	62.3%	20	37.7%	
	Secondary	96	55.5%	77	44.5%	
	University	479	65.5%	252	34.5%	
	Post-university	56	61.5%	35	38.5%	
Monthly income (SR)	< 5,000	240	64.0%	135	36.0%	0.468
	50,001–10,000	168	62.0%	103	38.0%	
	10,001–15,000	150	64.7%	82	35.3%	
	15,001–20,000	65	56.5%	50	43.5%	
	> 20,000	50	68.5%	23	31.5%	
Job	Student	129	64.8%	70	35.2%	0.134
	Teacher	140	58.8%	98	41.2%	
	Solider	55	73.3%	20	26.7%	
	Civil clerk	130	60.7%	84	39.3%	
	Private work	65	69.1%	29	30.9%	
	Retired	22	52.4%	20	47.6%	
	Jobless/housewife	132	64.7%	72	35.3%	
Sun exposure per week (hours)	No exposure	137	61.7%	85	38.3%	0.188
	1–3	316	60.9%	203	39.1%	
	4–7	103	65.6%	54	34.4%	
	8+	117	69.6%	51	30.4%	

## DISCUSSION

As the elderly population in Saudi Arabia increases, as will the burden on patients with osteoporosis. Hence, there is a need to understand the level of knowledge regarding osteoporosis in various regions of the country. In the current study, 36.9% of individuals had a good overall understanding of osteoporosis. These outcomes are consistent with a previous study from Riyadh, Saudi Arabia, which reported that a considerable proportion of adults were unaware of osteoporosis<sup>21</sup>. Older females were the most knowledgeable about osteoporosis, while knowledge of osteoporosis among middle-aged white males was low, which is in agreement with previous studies from Saudi Arabia<sup>19-21</sup>. Hence, knowledge of osteoporosis may not be an issue of public health education efforts, even in developed nations.

In the current study, the majority of the study participants were familiar with the consequences of osteoporosis but lacked significant details on the risk and protective factors. A previous study reported that the majority of the general Saudi population is familiar with this condition<sup>23</sup>. However, the level of knowledge differed based on age, education, income, and other sociodemographic factors<sup>21</sup>. The results of the current study reinforce these findings. For example, we found that older patients had a significantly greater knowledge of osteoporosis. Surprisingly, knowledge of osteoporosis decreased with increasing education level and income; this is likely due to the

lack of significant public health education efforts on osteoporosis in the region. As there can be regional disparities in the knowledge of diseases within a country, we address the knowledge of osteoporosis in the Aseer region to better public education measures and to allocate resources appropriately.

Adequate knowledge of any disease is fundamental to preventative behavior. Given the health and economic burden of an increasingly aging population in Aseer region (and Saudi Arabia), proactive public education measures are warranted for conditions such as osteoporosis. Osteoporosis is an increasing cause of morbidity and mortality in an aging population. Efforts encouraging greater physical activity, intake of vitamin D, and appropriate nutrition are examples of initiatives that could be encouraged.

## CONCLUSIONS AND RECOMMENDATIONS

**The outcomes of the current survey indicate that the participants were strongly aware of some aspects of osteoporosis, especially the symptoms, including sequelae, and predisposing factors. Generally, one in three individuals had satisfactory knowledge of osteoporosis, especially older females (higher risk group). Good awareness of osteoporosis and the application of effective osteoporosis treatment will improve strategies to minimize the incidence of osteoporosis;**

**this requires increased facilities for the diagnosis and management of osteoporosis. The measurement of BMD is a pivotal element in the internationally recognized definition of osteoporosis, and the diagnosis of osteoporosis depends on the evaluation of bone mass and quality. Given that adequate clinical tools for assessing bone quality are not widely available, osteoporosis will continue unabated unless diverse public health organizations come together and begin implementing national positive measures to improve osteoporosis awareness, testing, prevention, and treatment.**

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