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ORIGINAL ARTICLE

Knowledge and awareness about osteoporosis and its related factors among females in the eastern region of Saudi Arabia

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ABSTRACT

Background: Most of the population in Saudi Arabia do not use a good source of information to obtain sufficient knowledge about the disease, which predisposes them highly to the risk of osteoporosis. Therefore, we conducted a study to know the awareness, knowledge, and source of information about osteoporosis among females in the eastern region of Saudi Arabia.

Methodology: A cross-sectional study with a stage sampling technique was conducted in the eastern region of Saudi Arabia to evaluate the awareness, knowledge, and sources of information on osteoporosis and its related risk factor among women aged 18 years and above. The survey was distributed and published in social media. The associations between knowledge and socio-demographic characteristics of participants were tested using independent *t*-test and analysis of variance (ANOVA) tests. ANOVA tests were followed by Tukey's post-hoc test. The level of significance was set at 0.05.

Results: A total of 1,100 females filled the survey. There was no significant difference in knowledge score between age groups, place of residency, or educational level. However, a significant difference in the mean score of knowledge was present across the income level. Although 63.6% of the participants had a bachelor's degree and 2.4% had an education higher than that, 60.3% had poor knowledge, 37.5% had a moderate experience, and only 2.3% had high knowledge. Most of the participants do not trust their source of information, but they were using it either way; the commonest sources were the internet (61%), social media (41.1%), and healthcare providers (28.5%).

Conclusion: Most of the females in the eastern province of Saudi Arabia do not have sufficient knowledge about osteoporosis. The source of information among the majority was from the internet.

Keywords: Osteoporosis, females, knowledge, awareness, risk factors.

Introduction

Osteoporosis is a systemic, metabolic skeletal disease in which bone density and quality are reduced, predisposing the bone to be fragile and more susceptible to fractures, even with trivial falls or injuries [1-4]. Trivial falls or injuries are common among the elderly, which puts them at the risk of fractures and low quality of life [1-8]. Osteoporosis is a silent disease until a fracture occurs, and osteoporosis associated fractures are common in the hip, wrist, and spine [1-3]. The incidence of osteoporosis is associated with fracture increase in people who have a previous osteoporotic fracture and in advanced age [3]. Also, people who were in the last long-term steroid therapy are at a high risk for osteoporosis associated fracture as well [3]. Osteoporosis most commonly affects postmenopausal women especially due to estrogen depletion; elderly men are known to be affected as well [3]. Globally, an estimated 200 million people have osteoporosis [1,2,4]. Its prevalence in Saudi Arabia is estimated at 34%-39.5% of women aged 50-80 years and

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DISCOVER

21.4%-30.7% of healthy men. It is the leading cause of mortality and morbidity in the elderly population [1,2]. In developed countries, the prevalence of osteoporosis is high, especially among elderly women [1-5]. Also, the female gender, white race, low body mass index, and family history of osteoporosis are major risk factors for developing osteoporosis [1-5]. Smoking, alcohol, inadequate calcium, and vitamin D intake can predispose people to osteoporosis as well, especially the elderly [2-11].

According to the National Osteoporosis Society, bone fractures occur in one out of two women and one out of five men over the age of 50 [1,2,4]. Also, osteoporotic fractures are linked to premature mortality, affecting the quality of life [1,2,14,15]. Despite its high consequences, osteoporosis is still ignored, and the general perception of osteoporosis is weak worldwide [12-16]. In Saudi Arabia, little consideration has been made to know the awareness of osteoporosis among the public [1-4]. However, it has been found the relationship between awareness and knowledge about osteoporosis can decrease the incidence of osteoporosis associated with fractures [1-13]. Most patients often do not realize they have osteoporosis until the first fracture [1-4].

Furthermore, most people do not get their information about osteoporosis from a specialized physician or medical book; most people get them through the internet, family members, or friends [17-20]. A systematic literature review carried out in 2020 revealed a high incidence of fractures in patients who have osteoporosis due to low awareness and education about the disease [21]. Also, quality of life in patients with osteoporosis associated fracture is poor [21] Educating the general population and healthcare workers about osteoporosis is an essential step in the prevention and treatment of the disease, aiming toward improving the quality and accessibility of health services [10-16]. Our study aimed to evaluate the awareness, knowledge, and sources of information about osteoporosis among women in the eastern region of Saudi Arabia.

Subjects and Methods

A cross-sectional study with a stage sampling technique was conducted in the eastern region of Saudi Arabia to evaluate the awareness, knowledge, perception, and sources of information of osteoporosis and its related risk factor among woman who were aged above 18 years (this age was chosen to increase the likelihood of obtaining accurate responses from the study participants). The study questionnaire was designed and developed through a literature review of osteoporosis awareness. After that, the validity of the questionnaire was obtained through a review process with experts in the field. After incorporating the identified inconsistencies and inaccuracies, the questionnaire was pre-tested with 20 people to determine any problem relating to question design, flow, and interpretation. The final questionnaire comprised three sections and 44 items. Finally, it was distributed and published after obtaining ethical approval in the social media (a self-administered electronic questionnaire). The survey began with explaining the aim of the study and obtaining consent from all the participants before answering any question. Then, the participants were asked to answer about seven socio-demographical questions (age, residency, marital status, have children, occupation, education level, household income). The participants were also asked about their height and weight.

Risk assessment was performed asking participants about having a chronic disease that can increase the chance of developing osteoporosis [Diabetes Mellitus (DM), Hypertension (HTN), thyroid disorders, diagnosed previously with any rheumatic diseases]. Also, they were asked about previous low energy fractures (if she ever had low energy fractures, one or both of her parents had low energy fractures). Gynecological history also was taken (regularity of the period, taking any hormonal contraceptive method, reproduction age (reproductive age, perimenopause, menopause)). Furthermore, they were asked about their social history (smoking cigarettes and drinking alcohol) and if they were currently taking medication (corticosteroids, chemotherapy, heparin, lithium). A woman who was answering yes for any of the risk factors was classified into a high-risk group. A woman who is in the reproductive age and answered no for all the risk assessment questions was classified as a low-risk group. Before the knowledge questions began, the participants were asked if they think they have sufficient information about osteoporosis and their sources of information (healthcare provider, family/friends, social media (WhatsApp, twitter, etc.), internet, newspapers, awareness campaign, others).

Assessment of participants' knowledge toward osteoporosis was carried out using 21 questions within the questionnaire. 1 point was assigned for each question. Those answering right got 1 point and those answering wrong got 0 points. The total score of knowledge was calculated for each participant, wherein the minimum possible score was 0 and the maximum possible score was 21. Participants' knowledge scores were further classified into different levels (low, moderate, and high) based on cut-off points, which were 50% and 75%. Those scoring 50% of the total score and less (11 points and less) were classified as low level of knowledge, those scoring between 50% and 75% (12-16) were classified as moderate level of knowledge, and those scoring above 75% (17 and more) were classified as a high level of knowledge. Microsoft Excel was used for data cleaning and management. After management, data were exported to Statistical Packages for Social Sciences version 23 for analysis. Descriptive statistics were presented using frequency and percentages for categorical variables, and continuous variables were summarized using means ± standard deviations. The associations of knowledge with socio-demographic characteristics (age, residency, education level, and household income) of participants were tested using

independent *t*-test and analysis of variance (ANOVA) tests. ANOVA tests were followed by Tukey's post-hoc test to determine where the exact difference between subgroups exists. The level of significance was set at 0.05.

Results

A total of 1,100 females filled the survey. Table 1 shows the socio-demographic profile of the participants. The age distribution of participants is as follows: 31 (2.8%) were 18 years and younger, 567 (51.5%) were between 18 and 30 years, 219 (19.9%) were between 31 and 40 years, 200 (18.2%) were between 41 and 50 years, 74 (6.7%) were between 51 and 60 years, and 9 (0.8%) were 61 and older. The mean weight of participants was 65.72 ± 17.19, mean height was 158.41 ± 6.98, mean Body Mass Index (BMI) was 26.15 ± 6.82. As for the place of residency, the majority of participants were from Al-Ahsa (600, 54.5%), participants from Al-Qatif were 180 (16.4%) and those from Dammam were 156 (14.2%). The rest were from Al Khobar, Dahran, Al Jubail, and other cities. 389 (35.4%) were single, 669 (60.8%) were married, 28 (2.5%) were divorced, and 14 (1.3%) were widowed. 598 (54.4%) stated that they have children. As for the occupation, 410 (37.3%) were students, 359 (32.6%) were housewives, 248 (25.8%) were employed, and 47 (4.3%) were retired. 700 (63.6%) had a bachelor's degree, 2.4% had an education higher than that, 82 (7.5%) had a diploma, 269 (24.5%) had a secondary education, the others had an education less than secondary. The household income of participants is as follows: 149 (13.5%) had an income less than 5,000 Saudi Riyal (SR), 404 (36.7%) had an income between 5,000 and 10,000 SR, 358 (32.5%) had an income between 10,000 and 20,000 SR, and 189 (17.2%) had an income more than 20,000 SR.

***Table 1**. Demographic profile of the participants (n = 1,100).*

Age		
Below 18 years	31	2.80
18-30 years old	567	51.50
31-40 years old	219	19.90
41-50 years old	200	18.20
51-60 years old	74	6.70
61 years and older	9	0.80
Weight in kgs [mean, standard deviation (SD)]	65.72	17.19
Height in cm (mean, SD)	158.41	6.98
BMI (mean, SD)	26.15	6.82
Place of Residency		
Al-Ahasa	600	54.50
Dammam	156	14.20
Al Khobar	50	4.50
Al-Qatif	180	16.40
Dhahran	35	3.20
Al Jubail.	22	2.00
Others	57	5.20
Marital status		
Single	389	35.4
Married	669	60.8
Divorced	28	2.5
Widowed	14	1.3
Do you have children?		
Yes	598	54.4
No	502	45.6
Occupation		
Student	410	37.3
Housewife	359	32.6
Employed	284	25.8
Retired	47	4.3
Educational level		
Primary	4	0.40
Intermediate	19	1.70
Secondary	269	24.50
Diploma	82	7.50
Bachelor's degree	700	63.60
Master's degree	18	1.60
Doctorate	4	0.40
Others	4	0.40
Household income		
Less than 5,000	149	13.5
5,000-10,000	404	36.7
10,000-20,000	358	32.5
20,000 and more	189	17.2

Table 2 displays the risk assessment of osteoporosis in participants. 47 (4.3%) said they are smokers, 2 (0.2%) said they drink alcohol, and 42 (3.8%) said they are currently taking one of the following drugs: corticosteroids, chemotherapy, heparin, and lithium. 51 (4.6%) stated having a rheumatic disease, 151 (13.7%) stated having a fracture after falling from a slight height or sliding, and 155 (14.1%) had a parent who had a bone fracture in the wrist, hip, or lower back vertebrae. 58 (5.3%) had been diagnosed with osteoporosis secondary to chronic disease. 804 (73.1%) stated having a regular period and 90 (8.2%) stated using a hormonal contraceptive method. 920 (83.6%) were in the reproductive age, 85 (7.7%) were in perimenopause age, and 95 (8.6%) were in menopause age. Figure 1 shows participants' responses when asked if they think they have sufficient information about osteoporosis. 353 (32.1%) thought they did and 747 (67.9%) said they did not. Figure 2 demonstrates participants' sources of information, the three most common sources of information were the internet (61%), social media (41.1%), and healthcare provider (28.5%). Figure 3 shows participants' trust toward their knowledge about osteoporosis: 70.8% were trusting their knowledge to some extent, 16.8% were trusting their knowledge completely, and 12.4% did not trust their knowledge at all. Table 3 displays participants' answers toward knowledge questions. Table 4 shows participants' scores and knowledge level. The mean score of knowledge for participants was 9.51 ± 3.25. As for the knowledge level, 663 (60.3%) had poor knowledge, 412 (37.5%) had moderate knowledge, and only 25 (2.3%) had high knowledge.

Table 2. *Participants' Risk Assessment (n = 1.100).*

Question	*n*	%
Do you smoke a cigarette?		
Yes	47	4.3
No	1,053	95.7
Do you drink alcohol?		
Yes	2	0.2
No	1,098	99.8
Are you taking one of the following drug: corticosteroids, chemotherapy, heparin, lithium currently?		
Yes	42	3.80
No	1,058	96.2
Have you ever been diagnosed with rheumatic diseases?		
Yes	51	4.6
No	1,049	95.4
Have you ever had bone fractures after falling from a standing position?		
Yes	151	13.7
No	949	86.3
Have your parents or one of them ever had bone fractures in wrist, hip, or lower back vertebrae?		
Yes	155	14.1
No	945	85.9
Have you ever been diagnosed with osteoporosis secondary to chronic diseases (e.g., DM 1, HTN, Thyroid disorders)?		
Yes	58	5.3
No	1,042	94.7
Is your period regular?		
Yes	804	73.1
No	296	26.9
Do you take any hormonal contraceptive method?		
Yes	90	8.2
No	1,010	91.8
At which age you are?		
Reproductive age	920	83.6
Perimenopause	85	7.7
Menopause	95	8.6

Table 4 displays the association between the socio-demographic data of the participant with their knowledge score. There was no significant difference in knowledge scores across age groups, places of residency, or educational level. However, a significant difference in the mean score of knowledge was present across the income level (p = 0.035). Tukey's post-hoc test revealed a significant difference between those with an income of less than 5,000 SR and those with an income between 10,000 and 20,000 SR (p = 0.040).

Discussion

Primary osteoporosis is found mainly in postmenopausal women and elderly people. Secondary osteoporosis, on the other hand, is related to predisposing conditions such as smoking, chronic alcoholism, medical treatment (i.e., corticosteroids, chemotherapeutics, heparin, and lithium), chronic endocrinological diseases, rheumatoid arthritis, and chronic obstructive lung diseases. Postmenopausal osteoporosis and osteoporosis of aging are the commonest forms of the disorder. Unfortunately, osteoporosis is common in Saudi Arabia, and in our study, the results reveal that a considerable number of women living in the eastern region of Saudi Arabia are at risk of future osteoporosis. Data from this study revealed that a very high number of females in the eastern region do not have a sufficient amount of information about osteoporosis and most of them are taking their information about the disease from the internet and social media. Also, most of them do not believe their source of information but they are using it either way. Regardless of the different socio-demographic backgrounds, most of the women do not have sufficient knowledge and get most of their information from the internet and social media, and that can be explained by the easy and fast

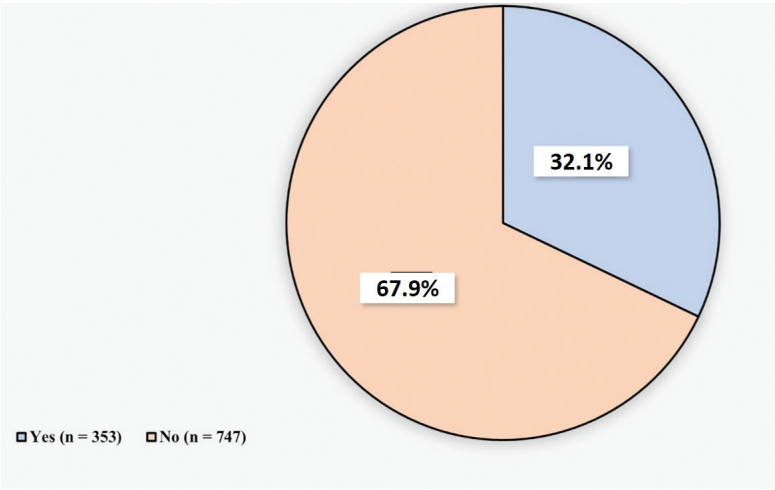

Figure 1. *Particpants' responses toward do you think you have sufficient information about osteoporosis.*

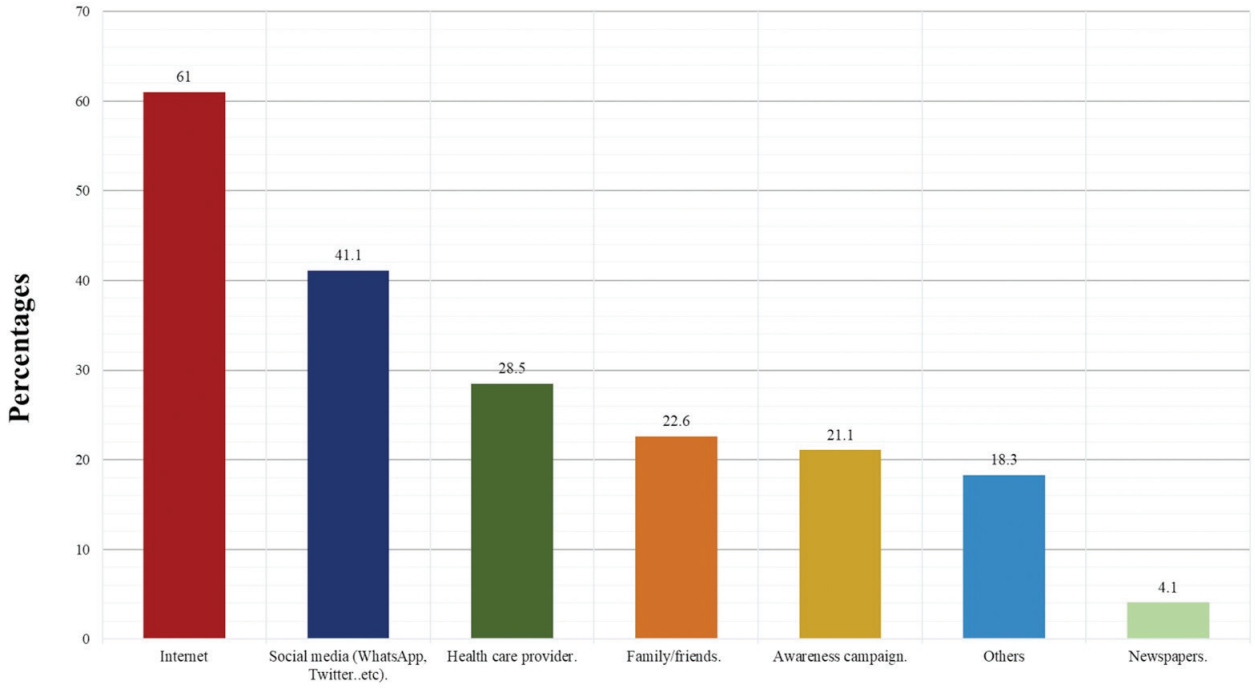

Figure 2. *Particpants' sources of information toward osteoporosis.*

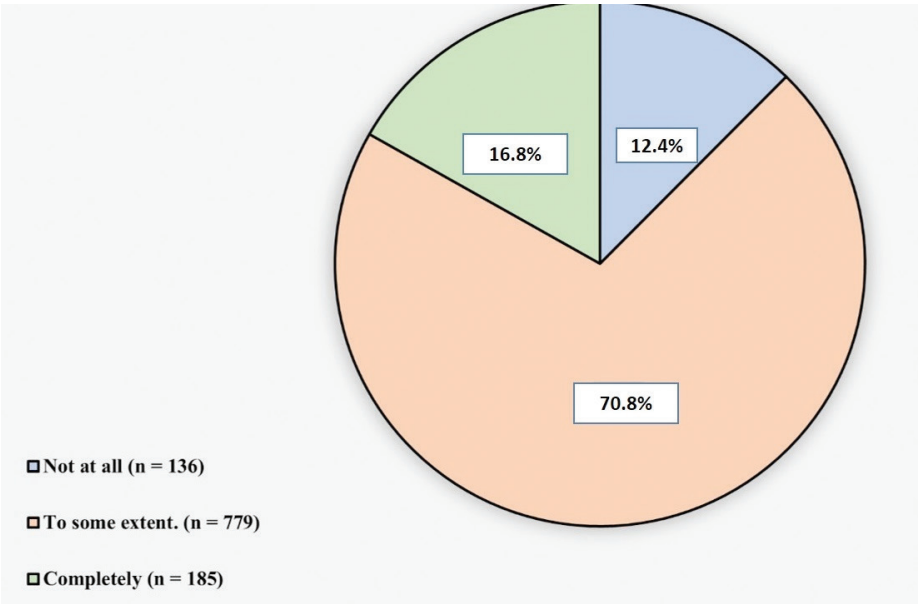

Figure 3. *Particpants' responses toward how much do you trust your information about osteoporosis.*

accessibility to the internet and social media. Also, we can explain the high incidence of osteoporosis and osteoporosis associated with fracture by getting misleading information about the disease from unauthorized sources. As many studies have reported, there is a strong association between osteoporosis and lack of sufficient information about the disease, which predisposes the patients later into further complications [1-5]. Our study reveals unexpected results toward the source of information about osteoporosis since everything can be reached easily nowadays either by calling a healthcare professional or attending seminars about the disease itself from a trained medical professional. Our results can be used as a step toward increasing the knowledge and awareness about osteoporosis to prevent the disease

Table 3. *Participants' responses toward questions answers (n = 1,100).*

Question	*n*	%
Q1/Osteoporosis leads to an increased risk of bone fractures		
Yes (Correct answer)	1,062	96.5
No	12	1.1
I don't know	26	2.4
Q2/Osteoporosis usually causes symptoms (e.g., pain) before fractures occur		
Yes	747	67.9
No (Correct answer)	93	8.5
I don't know	260	23.6
Q3/Having a higher peak bone mass at the end of childhood gives no protection against the development of osteoporosis in later life		
Yes	361	32.8
No (Correct answer)	173	15.7
I don't know	566	51.5
Q4/Osteoporosis is more common in men		
Yes	29	2.6
No (Correct answer)	808	73.5
I don't know	263	23.9
Q5/Cigarette smoking can lead to osteoporosis		
Yes (Correct answer)	579	52.6
No	104	9.5
I don't know	417	37.9
Q6/Alcohol consumption has a little effect on osteoporosis		
Yes	369	33.5
No (Correct answer)	310	28.2
I don't know	421	38.3
Q7/White women are at highest risk of fracture when compared to black women		
Yes	199	18.1
No (Correct answer)	326	29.6
I don't know	575	52.3
Q8/A fall is just as important as low bone density in causing fractures		
Yes (Correct answer)	738	67.1
No	232	21.1
I don't know	130	11.8
Q9/By age 80 years, the majority of women have osteoporosis		
Yes (Correct answer)	768	69.8
No	87	7.9
I don't know	245	22.3
Q10/From age 50 years, most women expect at least one fracture before they die		
Yes	178	16.2
No (Correct answer)	404	36.7
I don't know	518	47.1
Q11/Any type of physical activity is beneficial for osteoporosis		
Yes	594	54
No (Correct answer)	141	12.8
I don't know	365	33.2
Q12/ It's easy to tell whether I am at risk of osteoporosis by my clinical risk factors		
Yes (Correct answer)	557	50.6
No	168	15.3
I don't know	375	34.1

Question	*n*	%
Q13/ Family history of osteoporosis Strongly predisposes a person to osteoporosis		
Yes (Correct answer)	725	65.9
No	160	14.5
I don't know	215	19.5
Q14/An adequate calcium intake can be achieved from two glasses of milk a day		
Yes (Correct answer)	630	57.3
No	228	20.7
I don't know	242	22
Q15/Sardine and broccoli are good sources of calcium for people who can't take dairy products:		
Yes (Correct answer)	807	73.4
No	22	2
I don't know	271	24.6
Q16/Calcium supplements alone can prevent bone loss		
Yes	186	16.9
No (Correct answer)	682	62
I don't know	232	21.1
Q17/A high salt intake is a risk factor for osteoporosis		
Yes	271	24.6
No (Correct answer)	215	19.5
I don't know	614	55.8
Q18/There is a small amount of bone loss in the 10 years following the onset of menopause		
Yes (Correct answer)	433	39.4
No	85	7.7
I don't know	582	52.9
Q19/Early menopaused women are at highest of osteoporosis		
Yes (Correct answer)	559	50.8
No	54	4.9
I don't know	487	44.3
Q20/Hormone therapy prevents further bone loss at any age after menopause		
Yes	247	22.5
No (Correct answer)	138	12.5
I don't know	715	65
Q21/There are no effective treatments for osteoporosis available in Kingdom of Saudi Arabia		
Yes	197	17.9
No (Correct answer)	316	28.7
I don't know	587	53.4

Table 4. *Knowledge scores and classification.*

Scores	Mean	SD
Knowledge score (Total = 21)	9.51	3.25
Knowledge classification	*n*	%
Low knowledge level (50% or less)	663	60.30
Moderate knowledge level (50%-75%)	412	37.50
High knowledge level (above 75%)	25	2.30

and increase the quality of life for osteoporotic patients. Increasing knowledge and awareness about osteoporosis will play a major role in increasing the well-being of individuals, to live a great healthy life when they become old. We should pay more attention to those with an income of less than 5,000 SR (Table 4).

Table 5. *Association of socio-demographic with knowledge score.*

Age			
Below 18 years	10.23	2.69	0.168
18-30 years old	9.61	3.18	
31-40 years old	9.32	3.37	
41-50 years old	9.33	3.21	
51-60 years old	9.27	3.72	
61 years and older	11.67	2.12	
Place of residency			
Al-Ahasa	9.60	3.31	0.221
Dammam	9.85	3.18	
Al Khobar	8.90	3.14	
Al-Qatif	9.47	3.13	
Dhahran	8.54	3.05	
Al Jubail.	9.23	2.86	
Others	9.07	3.41	
Educational level			
Primary	11.75	3.78	0.410
Intermediate	10.21	3.24	
Secondary	9.33	3.03	
Diploma	9.44	3.13	
Bachelor's degree	9.54	3.31	
Master's degree	9.50	3.97	
Doctorate	12.00	4.69	
Others	11.25	3.40	
Household income			
Less than 5,000	9.01	3.16	0.035*
5,000-10,000	9.35	3.21	
10,000-20,000	9.85	3.32	
20,000 and more	9.62	3.20	

*Significant at level 0.05.

Conclusion

Lack of sufficient and authorized sources of information about the diseases is a big problem. There is a high need to increase awareness in the population about this condition and from where the information should be taken. To overcome this problem, many actions are organized, and plans should be implemented.

List of Abbreviations

Conflict of interest
The authors declare that there is no conflict of interest regarding the publication of this article.

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None.

Consent for publication
Informed consent was obtained from all the participants.

Ethical approval
This study has been performed following the ethical standards of King Fahad Medical City, Date: 10 August 2020, Letter Number: FWA00018774.

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