

# General population knowledge about osteoarthritis and its related risk factors in Jeddah Saudi Arabia

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## ABSTRACT

**الأهداف:** يهدف هذا البحث الى قياس مدى وعي سكان جدة بخصوص خشونة المفاصل والعوامل المسببة لها. كما يهدف البحث الى التعرف على الاعتقادات الخاطئة المنتشرة عن خشونة المفاصل.

**المنهجية:** تعد هذه الدراسة دراسة مسحية، حيث استهدفت عينة ممثلة لسكان جدة وتم الطلب منهم تعبئة استبيان يقيس مدى معلوماتهم عن خشونة المفاصل. احتوى الاستبيان على ثلاثة أجزاء رئيسية، وهي المعلومات الديموغرافية، معلومات عامة عن خشونة المفاصل، و جزء أخير مكون من 20 سؤال عن خشونة المفاصل.

**النتائج:** قام بالإجابة على الاستبيان 1238 شخص. كانت نسبة الإناث 55%، ومعظم أعمار المشاركين كانت بين 18-29 سنة. قرابة 62% منهم كانوا حاصلين على درجة البكالوريوس، وغالبيتهم لديهم أحدًا من أفراد عائلتهم أو إصدقائهم مصاب بخشونة المفاصل. اغلبهم أجاب بأن الأقارب والأصدقاء هم مصدر معلوماتهم الأول عن خشونة المفاصل. وعند سؤالهم عن طريقة تطور المرض فقط 37% منهم عرفوا الإجابة الصحيحة. متوسط النقاط في الإجابة على العشرين سؤال كان 9.84. لم يكون هناك فرق متوسطات النقاط بين الذكور والإناث أو مجموعات الأعمار المختلفة. ولاكن كان هناك فروقات شاسعة فالنقاط باختلاف إجابات الأشخاص على طريقة تطور خشونة المفاصل ( $p < 0.001$ )، باختلاف المستويات التعليمية ( $p < 0.001$ )، وباختلاف مصادر المعلومات ( $p < 0.001$ )، وعند معرفة شخص مصاب بخشونة المفاصل ( $p < 0.001$ ).

**الخاتمة:** أوضحت نتائج الدراسة مدى انخفاض مستوى وعي ومعلومات سكان جدة عن خشونة المفاصل. كما تم التعرف على الكثير من الاعتقادات الخاطئة عن المرض ليتم تصحيحها.

**Objectives:** To identify the knowledge gap and misconceptions about osteoarthritis (OA) and its risk factors among the general population of Jeddah, Saudi Arabia.

**Methods:** This is a cross-sectional study conducted in Jeddah, Saudi Arabia, between 11-13 April, 2019. The study was approved by King Abdullah International Medical Research Center. A representative sample of the public in well-known mall was asked to complete the questionnaire to assess their knowledge regarding OA. The questionnaire consisted of 3 parts: 1) demographic data, 2) general knowledge regarding OA, and 3) a quiz of 20 questions. A descriptive

analysis was carried out with t-test and F-test-based method.

**Results:** The study had 1238 respondents. Approximately 55% of them were females, with 51.8% between the ages of 18 to 29. Approximately 62% held a bachelor's degree and 63% had a family member or a friend afflicted with OA. Relatives and friends were the main source of information regarding OA. Only 37% correctly identified the mechanism behind OA. The mean score for the 20-item quiz was 9.84. No significant differences were found when comparing scores of males and females or those of age groups. However, significant differences in scores were identified between respondents of varying educational levels ( $p < 0.001$ ), participants' knowledge of the mechanism leading to OA ( $p < 0.001$ ), information sources ( $p < 0.001$ ), and knowing someone with it ( $p < 0.001$ ).

**Conclusion:** The results of our study suggest a low level of knowledge regarding OA among Jeddah population. Many misconceptions regarding OA were identified, so more information be brought to the public.

**Keywords:** osteoarthritis, population knowledge, questionnaire, knowledge, Saudi Arabia.

*Saudi Med J* 2020; Vol. 41 (5): 516-523  
doi: 10.15537/smj.2020.5.25061

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Received 7th January 2020. Accepted 31st March 2020.

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Osteoarthritis (OA) is the most prevalent form of arthritis, characterized by progressive degeneration, involving not only the articular cartilage, but the entire joint, including the subchondral bone and synovium.<sup>1,2</sup> Several pathological changes are observed in OA-affected joints, including degradation of the articular cartilage, subchondral bone thickening, osteophyte formation, variable degrees of synovium inflammation, ligament degeneration, including the knee menisci, and hypertrophy of the knee capsule.<sup>2</sup> These comprise the leading cause of joint pain, functional impairment, decreased mobility, increased risk of falls, and decreased physical activities.<sup>3</sup> Several risk factors are linked to OA, the most prevalent was age, gender, obesity, prior joint injury, genetic predisposition, misalignment, and abnormal joint shape.<sup>1,2</sup> Gender influences development of OA, with females having a higher risk than males. Once diagnosed, females also experience a higher severity of the disease.<sup>4</sup> Known to be a genetically complex condition, genetic factors play a major role in its development.<sup>5</sup> A study reported that obesity and previous knee injury significantly contribute to OA onset, wherein is obesity one of the major risk factors.<sup>2</sup>

In Kingdom of Saudi Arabia (KSA), OA related epidemiological data are considered outdated, limiting researchers' understanding of the prevalence, morbidity, and the public's knowledge regarding the disease. Moradi-Lakeh et al<sup>6</sup> stated that a high prevalence of knee OA have been reported in KSA.

A few studies reported the prevalence of certain types of OA in KSA; however, there is no literature related to the knowledge of the general public of Jeddah city regarding OA and the associated risk factors. In a study conducted in Aseer region, participants had a satisfactory level of knowledge regarding OA.<sup>7</sup> Literature recommended a study to be conducted to measure the knowledge related to the disease in the region. This cross-sectional study aims to assess and analyze the knowledge of the general population regarding OA and the associated risk factors in Jeddah, KSA.

**Methods.** The study used an observational cross-sectional design, and was conducted in Jeddah, KSA. The setting was a public, well-known mall in Jeddah (Mall of Arabia) with a good representative pool of the

general population. This mall was chosen because it is the biggest mall in Jeddah and its geographic location is accessible for people from all around Jeddah. Data collection started on 11 April, 2019, and was completed within 3 days. The study included people in Jeddah, from different nationalities, genders, and older than 18 years. Participants were selected randomly. We excluded individuals with a diagnosis of OA, since they would possibly know more about the disease. A non-probability convenience sampling technique was used. The sample size was calculated with a confidence level of 99%, along with an approximate population size (Jeddah has a population of 5,000,000), margin of error 5%, with a calculated sample size of 664 participants. Participants included 1238 (91%) out of 1362.

**Data sources/measurements.** After reviewing literature regarding the knowledge of the general public and searching all related articles in PubMed and Google scholar, some questions from a validated patient knowledge questionnaire related to OA (PKQ-OA) were adapted.<sup>8</sup> A self-administered questionnaire consisting of 3 sections in Arabic language was designed. The first section included demographic data, such as age, gender, and level of education. Participants were divided into 5 age groups (group 1: 18-29, group 2: 30-39, group 3: 40-49, group 4: 50-59, and group 5: 60 and older). The level of education was also categorized into 5 groups (no education, less than secondary, secondary, bachelor's, or higher education). In the second section, participants were asked about the definition of OA, and whether they understood it. In the third section, participants' knowledge was assessed using a 20-item quiz, focusing on general facts, symptoms, risk factors, diagnosis, and OA treatment options. The response options were yes, no, or I don't know, to avoid guessing. Each correct response scored 1 point, with 0 for wrong, or 'I don't know' answers, with a total score of 20 points. All questions had one correct answer based on the currently accepted orthopedic literature. To ensure content validity, 3 orthopedic surgeons were asked to revise the questionnaire to determine if the topic was covered adequately, and if there were any irrelevant questions. Construct or criteria validity was not determined due to a lack of a standardized comparison. A pilot study was carried out, with 25 participants from the general public completing the questionnaire and commenting on its length, design, wording, understanding, and ease of completion. The data in the pilot sample was not included in the study sample. During data collection, an online form of the questionnaire was used in the mall. The data collectors used a quick response (QR)

**Disclosure.** Authors have no conflict of interests, and the work was not supported or funded by any drug company.

code, scanned by participants' smart phones, which was completed in the presence of a data collector to ensure completion. Before inclusion, participants were assessed about fulfilling inclusion and exclusion criteria, and were excluded if ineligible.

Participants were asked if they were willing to participate and the completion of the questionnaire was accepted as consent. No data that could possibly identify a participant, such as a name or phone numbers was collected. The study was approved by an Institutional Review Board (IRB).

**Statistical analysis.** The raw data was processed and cleaned prior to the statistical analysis. Data management and analyses were carried out by using the IBM Statistical Software for Social Sciences (SPSS) for Windows, version 25 (IBM Corp., Armonk, N.Y., USA). Qualitative variables are presented as frequency and percentage and the quantitative variables as mean and standard deviation. The data comparison was carried out with a student-t-test and F-test within a *p*-value of 0.05.

**Results.** The sample size was 1,238. The majority of participants (55%) were female. In terms of age, the majority (52%) were 18 to 29 years-old, with 24% in the 30 to 39 years-old, and 17.5% in the 40 to 49 years-old. Only a small proportion (1%) was 60 years or older. The most frequent levels of education were bachelor's degree (62%) and a completed high school education (24%). A small proportion (7.7%) achieved an educational level higher than a bachelor's degree. The majority of the sample (63%) had a family member or friend who was diagnosed with OA (Table 1).

Approximately 37% was knowledgeable about underlying mechanisms of OA, and correctly identified it as a process in which the protective cartilage at the bone ends wore down over time. A small proportion (15.3%) indicated acid accumulation in the joint and 11.1% chose compression of a nerve passing near the joint. It is noteworthy that 26% had no knowledge about OA at all. In terms of source of information, almost half (44.8%) indicated relatives and friends. A small proportion (19%) indicated the Internet and social media, with only 7.6% acquiring information from a physician (Table 2).

The mean score for the 20-item quiz was  $9.84 \pm 3.27$ . The first part of the quiz consisted of 5 general facts regarding OA. In terms of it being a chronic problem, 67.5% responded yes and 60% did not think OA was rare. Only 36.6% knew that OA can affect different

joints, 35.2% negatively responded to OA being caused by cold, damp weather, and only 34.8% knew that OA was not caused by a microorganism.

The second part of the quiz included 4 questions about the main symptoms of OA. More than half (51%) knew that pain was not the only symptom, 51.3% also indicated stiffness, and 40.1% knew that swelling was a sign. The majority (66.8%) agreed that OA could lead to loss of joint movement. The third part assessed knowledge about the main risk factors of OA. More than a third (37.3%) knew that genetic factors can predispose to OA, while the majority (80%) knew aging to be a risk factor. In terms of gender being equally affected by OA, less than 50% indicated whether this was the case. The last part of the quiz focused on the diagnosis and treatment of OA. Approximately 46.7% used physical examination and x-ray and 30.5% through blood tests. Regarding treatment, 46% chose nonsteroidal anti-inflammatory drugs and 52.6% thought acid-free diets were a proven treatment. The majority (69%) found that exercise, such as swimming, was beneficial, such that 75% responded that physiotherapy could improve OA symptoms. A third (34.5%) were sceptical about an intra-articular stem cell injection or hyaluronic acid used as an effective modality for OA, while 34.5% knew

**Table 1** - Mean knowledge score by demographic variables.

Item	n	(%)	Mean knowledge score	P-value
<i>Gender</i>				
Male	558	(45.1)	9.67	0.099
Female	680	(54.9)	9.98	
<i>Age</i>				
18-29	641	(51.8)	9.73	0.702
30-39	300	(24.2)	9.86	
40-49	215	(17.4)	10.08	
50-59	69	(5.6)	9.99	
≥60	13	(1.0)	10.15	
<i>Education</i>				
Uneducated	9	(0.7)	6.89	0.000*
Less than secondary	41	(3.3)	9.22	
Secondary	298	(24.1)	9.09	
Bachelor	795	(64.2)	10.17	
Higher education	95	(7.7)	9.97	

\*significant at 1%

**Table 2** - Knowledge by knowledge related responses and source of information.

Item	n	(%)	Mean knowledge score
<i>Underlying mechanism</i>			
Blood that reach the joint decreases with aging	132	(10.7)	9.49
Nerve passing near the join gets compressed	137	(11.1)	10.3
Cartilage on the ends of the bones wears down over time	458	(37.0)	10.67
Acid accumulation inside the joint	189	(15.3)	10.14
I don't know	322	(26.0)	8.43
<i>Source of information</i>			
Personal experience	121	(9.8)	10.05
Relatives and friends	555	(44.8)	10.12
Television	58	(4.7)	8.74
Internet and social media	238	(19.2)	9.39
School or university	132	(10.7)	10.38
Books, magazines and newspapers	40	(3.2)	8.9
Physician	94	(7.6)	9.34
<i>Knowing patient with osteoarthritis</i>			
Yes	780	(63.0)	10.27
No	458	(37.0)	9.1

**Table 3** - Participants' answers to 20-items quiz.

Items on the quiz	Yes	No	Not sure
1 Do you think osteoarthritis is a chronic problem?	67.5	18.4	14.1
2 Do you think osteoarthritis is rare?	19.1	60.1	20.8
3 Do you think that different joints can be affected by osteoarthritis?	36.6	41.4	20.0
4 Do you think osteoarthritis is caused by cold, damp weather?	41.4	35.2	23.4
5 Do you think it is developed by a microorganism?	28.1	38.5	33.4
6 Do you think pain is the only symptom of osteoarthritis?	33.2	51.7	15.1
7 Do you think stiffness is a symptom of osteoarthritis?	51.3	32.8	24.9
8 Do you think swelling is a sign of osteoarthritis?	40.1	35.5	24.4
9 Do you think osteoarthritis can lead to loss of joint movement?	66.8	18.2	15.0
10 Do you think there are genetic factors that can predispose parson to osteoarthritis?	37.3	40.6	22.1
11 Do you think aging is a risk factor for osteoarthritis?	81.0	10.3	8.7
12 Do you think men and women are equally affected by osteoarthritis?	29.5	49.0	21.5
13 Do you think physical examination and x-ray are used to diagnose osteoarthritis?	46.7	32.0	21.3
14 Do you think blood tests are used to diagnose osteoarthritis?	30.5	41.5	28.0
15 Do you think NSAIDs can improve osteoarthritis symptoms?	46.0	36.5	17.5
16 Do you think some forms of exercise like swimming is suitable for people with osteoarthritis?	69.0	13.9	17.1
17 Do you think acid-free diets are a proven treatment for osteoarthritis?	52.6	18.2	29.2
18 Do you think physiotherapy can cause a great improvement in the symptoms of osteoarthritis?	75.7	10.0	14.3
19 Do you think intra-articular injection by stem cell or hyaluronic acid is an effective modality for curing OA?	27.6	35.1	37.3
20 Do you think a joint replacement surgery will be the ultimate option to relieve the symptoms of osteoarthritis?	345.0	33.3	32.3

OA - osteoarthritis, NSAIDs - nonsteroidal anti-inflammatory drugs

that joint replacement surgery was the final option to relieve OA symptoms (Table 3).

When comparing the mean score based on gender, the male subgroup scored  $9.67 \pm 3.3$  and the female subgroup scored  $9.98 \pm 3.2$ , which was not statistically significant ( $p=0.099$ ). Although the 40-49-year-old subgroup scored higher ( $10.1 \pm 3.3$ ) than the other age groups, the difference was not statistically significant ( $p=0.702$ ). However, a significant difference in the educational level score means was found ( $p<0.001$ ): the bachelor educational level subgroup had the highest mean score ( $10.17 \pm 3.1$ ), compared to the uneducated subgroup ( $6.89 \pm 2.6$ ). In terms of responses related to the underlying mechanism of OA, the group that correctly knew the underlying mechanism scored  $10.67 \pm 3.1$ , which was significantly higher than the other groups ( $p<0.001$ ). The subgroup that indicated their source of information about OA was school and university, scored  $10.38 \pm 3.4$ , which was significantly higher than the other groups ( $p<0.001$ ). In addition, the subgroup with a family member or friend diagnosed with OA, had a significantly higher mean score ( $10.27 \pm 3.2$ ,  $p<0.001$ ).

**Discussion.** Due to very little literature about OA, the current study suggests further studies be carried out to help inform the general public of KSA. This study included a large sample in terms of age, gender, and educational level that is representative of the general public. This study explored the knowledge related to OA and the associated risk factors of a segment of the general public in Saudi Arabia.<sup>7</sup> More than half of the sample (55%) was female, the majority (62%) held a bachelor's degree, and 52% were in the 18 to 29-year-age group, reflecting the large proportion of young adolescents (52.7%) in the societal demographics of the Saudi population.<sup>9</sup> Given the high prevalence of OA in Saudi Arabia, 15.3% in all age groups, it was not surprising that the majority (66%) of the sample knew a relative or a friend diagnosed with OA.<sup>6</sup>

The sample had a low level of knowledge regarding the underlying mechanism of OA with only 37% correctly identifying the cause. The findings also indicated that a small proportion (15.3%) were confused and could not differentiate between OA and gout. This common misconception could be due to the association of both conditions with advancing age and obesity and frequently co-exist in an individual; however, the pathogenic relationship between OA and gout is still unknown.<sup>10</sup> Surprisingly, just less than half (44.8%) reported their source of information about OA to be their friends and family, which was

contrary to similar studies assessing the knowledge of the general public.<sup>11-13</sup> The finding is a concern because the friends and family may not be knowledgeable to provide the correct medical information. In addition, few participants (19%) relied on the Internet and social media as their source of information. However, it has been shown that the quality of the information available on the Internet is a concern as many negative consequences have been reported.<sup>14-16</sup> It should be noted that only 7.6% obtained their OA related information from a physician, highlighting the need for physicians to intensify their efforts to educate their patients and their families and to correct their misconceptions.

The majority of the sample (67.5%) knew that OA is a chronic disease with 60% knowing that it is not a rare disease. Osteoarthritis is a prevalent disease and the single most frequent cause of disability in older adults.<sup>17</sup> Osteoarthritis affects weight bearing joints such as the lumbosacral spine, hip and knee; however, it can affect other joints such as the interphalangeal, carpometacarpal and temporo mandibular.<sup>18</sup> Only a third in the current study (36.6%) knew that OA may also affect other joints and 42% thought OA is caused by cold, damp weather, a misconception attributable to the fact that weather instability may have an impact on the joint pain perception of people with OA; however, the weather does not cause OA.<sup>19</sup> It is also concerning that only 34.8% knew that OA is not caused by a microorganism and 34.8%.

**Symptoms of osteoarthritis.** The predominant symptom of OA is pain which is usually the reason for a medical consultation. Other symptoms include stiffness, particularly in the morning or after a period of inactivity and resolves within 20 to 30 minutes.<sup>20</sup> About half of our sample knew that pain is not the only symptom of OA and just more than half (51.3%) identified stiffness as an OA symptom. Swelling of the joint (40%) often presents in the beginning of the disease and patients with OA have a restricted range of motion (67%) which is directly associated with their disability.<sup>21</sup>

**Risk factors of osteoarthritis.** The majority (81%) knew that aging is a risk factor. In addition, females have a higher change of developing OA and are afflicted more severely by the disease.<sup>1</sup> Only half of the participants knew about the gender differences in the context of OA. A strong genetic basis for OA is a known risk factor and heredity accounts for about half of the OA cases affecting the hands and the hips and a smaller percentage, the knees.<sup>1</sup> Only a third of the sample (37.3%) knew about the genetic association with OA.

**Diagnosis and treatment of osteoarthritis.** Plain film radiography, history and physical examination are sufficient to diagnose OA. The use of blood biochemical markers in the diagnosis of OA is limited. Many markers have been proposed like C-terminal telopeptide of collagen type II and cartilage oligomeric matrix protein, markers of tissue degradation, but they have not yet been sufficiently validated for use in clinical practice.<sup>22</sup> Less than half of the sample knew that an x-ray and physical examination are used to diagnose OA and only 42% knew that a blood test is not used to diagnose OA. Regarding the management of OA, NSAIDs play an important role in controlling the symptoms which was known by 46% of the participants.<sup>22</sup> Exercise in the form of swimming is suitable for patients with OA and is associated with an improvement in symptoms, joint stiffness and muscle strength,<sup>23</sup> known by the majority (69%) of the sample. Another erroneous belief of half of the sample was that acid-free diets could treat OA which can be attributed to their lack of understanding of the underlying mechanism of OA. Physiotherapy is considered one option in the treatment of OA, as it improves pain and joint function in 50%-75% of patients.<sup>24</sup> In the current study, 75% knew that physiotherapy could significantly improve OA. Less than a third (28%) responded that an intra-articular injection of stem cell or hyaluronic acid is used as a modality for curing OA. The use of stem cell injection has drawn considerable attention in the past few years. Many studies are being conducted to investigate the safety and efficacy; however, the majority are still in an early phase and it is premature to draw a conclusion about its potential curative effect.<sup>25-27</sup> However, intra-articular hyaluronic acid therapy has been shown to cause a significant improvement in pain, function, and stiffness.<sup>28</sup> Though there was no increase in adverse events, the safety profile of hyaluronic acid therapy requires more evidence.<sup>29</sup> Total and partial joint replacement for advanced disease remain the mainstay of treatment.<sup>22</sup> In this study, 35% of the participants knew that joint replacement surgery is the final option to relieve the symptoms of OA.

**Participant scores stratified by gender, age, level of education, underlying mechanism, source of information and knowing someone with osteoarthritis.** The scores of the participants were calculated and analyzed with the total score of 20. The overall mean knowledge score was 9.84. Both age and gender were not statistically significant but a statistically significant difference was found for educational level. The bachelor subgroup had a significant difference in the total mean score compared to the other educational subgroups. This might be due

to the comprehensive curricula offered in Saudi public colleges where undergraduate students are encouraged to enrol in elective courses not directly related to their majors, resulting in being exposed to various disciplines. Overall, this conventional conception, where the awareness level directly dictates the proportionality of acquired awareness, appears to be the norm across various health disciplines as evidenced by literature related to levels of knowledge and/or awareness.<sup>2,30</sup>

The subgroup who correctly identified the underlying mechanism, scored higher relative to the other subgroups, which may indicate prior knowledge about OA. In addition, participants who indicated their primary source of information as an educational institution scored significantly higher than the other subgroups. This maybe due to the quality of educational material offered in such settings in contrast to information broadcasted via television commercials and programs as the television and social media subgroup had the lowest score. The findings of the current study highlight the urgent need for high-spectrum educational campaigns to be main streamed through several outlets, including television, social media, and paper-based news outlets. Knowing a patient diagnosed with also significantly contributed to better overall knowledge about the disease. This may be due to information communicated by the patient, accompanying the patient to their physician visits, or self-learning prompted by the strong societal dynamics between individuals in Saudi Arabia. In previous similar study that was carried out in Aseer region and included 1052 participants, the level of knowledge about OA was good particularly regarding preventive measures of OA.<sup>7</sup> Similar to this study, they found participants who held a bachelor's degree to have better knowledge about the disease. Whereas they found participants whose age was 50 year or older had higher level of knowledge and awareness about OA; however, our study demonstrated no differences in the knowledge between participants of varying age groups.<sup>7</sup> Another study assessed level of knowledge of OA among railway workers in Malaysia reported the majority of the participant to have low knowledge level.<sup>31</sup> They noticed having a family member with OA is a good predictive factor of having better knowledge.<sup>31</sup>

The findings of current study demonstrated the lack of knowledge about OA and the associated risk factors in the general public. It would have been interesting to compare the current study to previous studies; however, our study was the first of its kind. Awareness campaigns are one of the methods to increase the general public's knowledge about OA. Communication with health care professionals and initiating educational programs

can bridge this gap and facilitate a better understanding of such a prevalent disease in the general public. Osteoarthritis would be understood if information was provided in a clear, non-medical language and made available to the public free of charge. In addition, developing free tools, info-graphics, and resources about OA, injury prevention, obesity management, physical activities, and self-management education would be empowering and improve knowledge. The widespread use of social media makes it an ideal medium for awareness advertisements and advantage can be taken of social media outlets such as Instagram, Snap Chat, and Twitter to distribute initiatives directly to the population of Jeddah.

**Study limitations.** The results of this study are not generalizable since it was conducted in one geographic location and a convenience sampling technique was used for data collection. Another limitation is the socioeconomic variability of the Jeddah public as the reliability of some measures may be influenced by a lower socioeconomic status and no data was collected related to the participants' income.

In conclusion, the general public of Jeddah exhibited low levels of knowledge about OA and its associated risk factors: it is a preventable disease that affects quality of life for patients. Many misconceptions about the causes, risk factors, and management of OA were identified, although improving the public's knowledge would add significant value. Awareness campaigns could also be used to increase the population's knowledge, which may result in early detection of the disease, correcting misconceptions and preventing harmful and unproven practices in OA management. More studies are required to investigate the population's knowledge as well as to provide physicians with evidence of common misconceptions.

**Acknowledgment.** The authors would like to acknowledge Dr. Mohammad B. Abrar, Dr. Abdulaziz Basaqr, and Dr. Mohammad Khan for their appreciated efforts in reviewing the design and content of the questionnaire. We thank Dr. Susanna Wright from the publication office in KAIMRC for her review and editing of the manuscript. We also thank the volunteer data collectors without whom the study would not have been carried out. We thank all the participants for their effort and time in completing the questionnaire. We would like to thank American manuscript editors (<https://americanmanuscripteditors.com/index.aspx>) for English language editing.

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