Knowledge, Attitude and Practice (KAP) Regarding Osteoporosis among General Population in Saudi Arabia

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Authors' contributions

This work was carried out in collaboration between all authors. Author AET designed the study, wrote the protocol and wrote the first draft of the manuscript. Author SSB managed the literature searches, and statistical analyses of the study and author NIAS distributed the questionnaire electronically and collected the data. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Background: Osteoporosis is a disease characterized by low bone mass and micro- architectural deterioration of bone tissue. The prevalence of osteoporosis among Saudi population was estimated at 34% in a review of the published articles up to 2011. The etiology for this high prevalence among Saudis is multi- factorial and possible causes include: lifestyle malpractices, vitamin-D deficiency and genetic factors.
Aim: To evaluate knowledge and perceptions of causes and prevention of osteoporosis among general population of Saudi Arabia.
Methodology: A national cross-sectional, web-based survey was conducted on 579 participants

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of general population in Saudi Arabia aged 15 to 65 years old in March 2015 and the questionnaire was validated.

Results: Out of 579 participants, 559 have heard about osteoporosis, the main resources were (43.44%) family members and friends. More male (58%) were able to identify that osteoporosis is a silent disease while only (44.4%) female did. the only risk factor that was identified by more than three quarter of participants in both (91.7%) male and (94.8%) female groups was not eating calcium-rich foods. Previous hip fracture was the lowest recognized risk factor (56.66%) of participants. participants with master degree had the best knowledge compared to participants other degrees. Participants with ages between 51-65 years had the higher percent of correct answers while those aged between 15-35 years had the lowest. Approximately 68.1% of respondents were concerned of having osteoporosis in a point of their lives. Almost two thirds (65.6%) thought that they can influence the probability of having osteoporosis. About 8.82% had measured their bone mineral density BMD, while 43.40% of them knew that they have more than one risk factor.

Conclusion: This study reveals that osteoporosis knowledge is low among the Saudi population and consequently the attitude and practices towards this disease are also below normal. A good knowledge and awareness of a disease are pre-requisites for success of preventive measures, modifications in life styles and treatment adherence.

1. INTRODUCTION

The World Health Organization (WHO) defines osteoporosis as a disease "characterized by low bone mass and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk [1]". It is one of the most common metabolic diseases and it manifests itself only after sufficient damage has been done [1]. Osteoporosis can be classified as primary or secondary. Primary osteoporosis can be further defined as type 1 or 2. Type 1, postmenopausal osteoporosis, is associated with increased cortical and cancellous bone loss resulting from increased bone resorption, typically occurring during the first 3 to 6 years after menopause. Type 2, senile osteoporosis, occurs in both women and men 75 years of age and older. Secondary osteoporosis results from use of various medications or the presence of particular disease states and this type of osteoporosis can occur at any age [2].

The prevalence of osteoporosis among Saudi population was estimated at 34% in a review of the published articles up to 2011 [3]. The etiology for this high prevalence among Saudis is multi-factorial and possible causes include: lifestyle malpractices, vitamin-D deficiency and genetic factors [4]. According to the WHO diagnostic classification, osteoporosis is defined by bone menial density (BMD) at the hip or lumbar spine that is less than or equal to 2.5 standard deviations below the mean BMD of a young-adult reference population.

Qualitative ultrasound and dual-energy x-ray absorptiometry could be used for screening for osteoporosis. The currently available literature on Saudi Arabian population suggests that the ideal age for screening for low bone mass among the Saudi population should be earlier (55 years) comparing to ±65 years recommended in Western countries [3].

Since osteoporosis is a risk factor for fracture [5], all postmenopausal women and men age 50 and older should be evaluated for osteoporosis risk, the more risk factors that are present, the greater the risk of fracture. Osteoporosis is preventable and treatable, but because there are no warning signs prior to a fracture, many people are not being diagnosed in time to receive effective therapy during the early phase of the disease [6].

Morbidity of osteoporosis is secondary to the fractures that may occur. Importantly, even after the first fracture has occurred, there are effective treatments to decrease the risk of further fractures [5]. Main risk factors are age, female sex, family history, low weight, decrease mobility, low calcium intake, cigarette smoking, predisposing medical problem such as liver disease and hyperthyroidism and long-term consumption of glucocorticoids [2]. The most widely recognized risk factors for osteoporosis are advanced age (>65 years) and history of fracture [7].

Lifestyle changes that help to stay healthy in general can also help protect from

developing osteoporosis, this includes: Limiting alcohol, Not smoking cigarettes, Eating foods with plenty of calcium and vitamin D (including dairy products, kale, broccoli, canned salmon, and sardines), Regular weight-bearing exercise such as walking, dancing, or climbing stairs [6]. Programs designed to educate patients about non- pharmacologic strategies for reducing osteoporosis risk have been shown to result in long-term beneficial changes in patient behavior and health attitudes [8].

Considerable number of adult males and females are unaware about osteoporosis. Therefore, education programs are needed to improve awareness and motivating healthy behaviors [9]. It is important to increase awareness of osteoporosis and encourage adoption of behaviors that help to prevent this condition, as opposed to waiting until the onset of the disease. The three important components of such programs include appropriate diet, exercise, and lifestyle choices [8]. Improving knowledge and awareness of osteoporosis in general public would significantly reduce osteoporosis -related fractures and reduce overall economic impact of osteoporosis.

Various studies have been conducted to evaluate knowledge, attitude and practices (KAP) of osteoporosis in different geographical settings with varied community population. Due to the varying nature of instruments and methodology used, it is not possible to compare these studies. The main focus of those studies was women who were already suffering from osteoporosis. It must be noted that those who are already suffering from a disease or are under treatment of a particular disease would have better knowledge of that disease as they are in direct contact with health care professionals. Hence, the results of such studies cannot be generalized for the whole population [1].

1.1 Aims of the Study

1.1.1 The aims of the current study

1. To evaluate knowledge and perceptions of causes and prevention of osteoporosis among general population of Saudi Arabia.
2. To compare KAP levels of men and women.

3. To identify range of age groups and educational degrees who need more education on osteoporosis.

2. SUBJECTS AND METHODS

A national cross-sectional, web-based survey was conducted on 579 participants from the general population in Saudi Arabia aged 15 to 65 years old in March 2015. The questionnaire was validated. The questionnaire was designed in English then translated into Arabic. The questionnaire was divided into 4 sections: socio-demographic and characteristics of the participants, knowledge of osteoporosis, and their attitude towards osteoporosis and practice. The survey was anonymous.

2.1 Data Analysis

The results were collected and analyzed by Survey Monkey in Arabic then translated to English. The data were also analyzed using a computer based statistical package for social science (SPSS) V.22. Correlations were used between various variables (Knowledge vs Sex, Knowledge vs Education degree and Knowledge vs Age groups) to accomplish the intended aims.

3. RESULTS

3.1 Socio-demographic Characteristics of Participants

Out of 579 participants, 422 (72.88%) were female while 157 (27.12%) were male from various parts of Saudi Arabia. Their age ranged between 15-65 years old, most of them were between 15-35 years old (72.02%) and two participants were aged 65 years old.

Slightly more than half (55.36%) of participants were weighted between 51-65 kg (declared weight) and 308 (53.30%) of them had a height range between 131-160 cm. Out of 330 (57.49%) were single while 244(42.51%) were married.

Regarding education degree almost one quarter (21.11%) of participants were high school students and more than two quarters (59%) were university graduates with bachelor degrees while only 12 (2.08%) had a doctorate degree.

As for the work status of the participants; slightly more than half (57.64%) were not working and the remaining (42.36%) had a career, in 127 (51.84%) cases the word required long standing periods, while 118 (48.16%) had sedentary jobs (Table 1).

3.2 Knowledge of Osteoporosis among Participants

Five hundred fifty nine of participants have heard about osteoporosis, the main resources were family members and friends 245 (43.44%) as well as television (191) (33.87%). Nearly half of participants identify osteoporosis as silent disease (48.19%) while 186 (32.12%) could not. More than a three quarter (91.88%) knew that osteoporosis increase risk of having fractures.

Regarding knowledge of participants about risk factors of developing osteoporosis, 234 (40.48%) did not know that previous fractures from imbalance or falling are considered a risk factor compare to 213 (36.68%) how knew. For previous hip fracture 329 (56.77%) could not recognize it as a risk factor as with family member how were diagnosed with osteoporosis 232 (40.14%) while 206 (35.64%) recognize the later.

Almost all participants (93.96%) knew that not eating calcium rich foods is a risk factor. Lack of regular exercise and early menopause were recognized by participants as a risk factor (60.59% and 72.49%) respectively.

Regarding importance of osteoporosis prevention, 531(92.03%) thought it is very important, 46 (7.97%) thought it is important and no one (0%) thought it is not important (Table 2).

Table 1. Socio-demographics characteristics of participants (n = 579)

Characteristics	n	Percentage (%)
1. Sex:		
- Male	157	27.12%
- Female	422	72.88%
2. Age:		
- 15- 35 years old	417	72.02%
- 36 - 50 years old	122	21.07%
- 51 - 65 years old	38	6.56%
- More than 65 years old	2	0.35%
3. Weight:		
- Less than 50 kg	78	13.49%
- 51 - 75 kg	320	55.36%
- 76 - 100 kg	148	25.61%
- More than 100 kg	33	5.54%
4. Height:		
- Less than 100 cm	6	1.04%
- 100 - 130 cm	37	6.25%
- 131 - 160 cm	308	53.30%
- More than 160 cm	228	39.41%
5. Marital status:		
- Single	332	57.5%
- Married	247	42.5%
6. Education degree:		
- Below high school	24	4.15%
- High school	122	21.11%
- Diploma	55	9.52%
- Bachelor	342	59%
- Master	24	4.15%
- Doctorate	12	2.07%
7. Work status:		
- Working	245	42.36%
- Do not work	334	57.64%
8. Nature of work:		
- Standing for long time	127	51.84%
- Sitting for long time	118	48.16%

Table 2. Knowledge of osteoporosis among participants (n=579)

Item no.	Yes n (%)	No n (%)	Neutral n (%)	Do not know n (%)
1. Do you think osteoporosis is a silent disease	279 (48.19)	186 (32.12)	63 (10.88)	51 (8.81)
2. Osteoporosis increase the risk of having fractures	532 (91.88)	11 (1.90)	13 (2.25)	23 (3.97)
3. Is previous fracture from imbalance or falling a risk factor?	213 (36.68)	234 (40.48)	42 (7.27)	91 (15.57)
4. Is previous hip fracture a risk factor?	110 (19.10)	329 (56.77)	51 (8.85)	89 (15.28)
5. Is not eating calcium-rich foods a risk factor?	544 (93.96)	17 (2.94)	12 (2.07)	6 (1.03)
6. One of first or second generations family member diagnosed with osteoporosis consider a risk factor	206 (35.64)	232 (40.14)	53 (9.17)	88 (15.05)
7. Is lack of regular exercise a risk factor?	408 (70.59)	71 (12.28)	53 (9)	47 (8.13)
8. Early menopause are at higher risk of osteoporosis	419 (72.49)	26 (4.50)	22 (3.81)	112 (19.20)

3.3 Knowledge of Osteoporosis Stratified by Sex and Correct Answer

Table 3 shows that 58% of males were able to identify that osteoporosis are a silent disease while only 44.4% female did.

Three hundred ninety six female participants (94.1%) and 135 (86%) of male participants knew that osteoporosis increase risk of having fractures.

For the remaining items subjects were asked about risk factors of developing osteoporosis and the only risk factor that was identified by more than three quarter of participants in both (91.7%) male and (94.8%) female group was not eating calcium-rich foods.

Lack of regular exercise was known as risk factor by 113 (72%) male and 294 (70%) female. 322 out of 422 female knew that early menopause increase risk of osteoporosis.

Participants who knew that previous fracture from imbalance or falling and the presence of a family member diagnosed with osteoporosis are risk factors were 63 (40.1%) and respectively 56 (35.7%) of male and 149 (35.5%) & 150 (35.7%) of female, respectively.

Previous hip fracture was the lowest recognized risk factor as only (19.6%)

Female and (17.8%) male did identify it as such.

3.4 Knowledge of Osteoporosis Stratified by Education Degree and Correct Answer

Table 4 shows that <16 (66.7%) of participants who have a master degree were the highest percentage in relation to all other degrees who identify osteoporosis as a silent disease. About ninety five percent of them (95.8%) know that osteoporosis increases the risk of fractures, 91.7% of them know that menopause is a risk factor and (95.8%) of them considered not eating calcium-rich foods a risk factor too.

High school students were the higher percent who answered correctly in knowing two of the risk factors which are previous fracture from imbalance or falling and lack of regular exercise by 51 (41.8%) and 91 (74.6%), respectively.

Compared to other education-related sub-groups, participants with bachelor degree were the category with highest percentage (130-38.2%) of participants who knew that the presence of a family member with osteoporosis is a risk factor.

Participants with education levels below high school had the lowest rate of correct answers.

Table 3. Knowledge of osteoporosis stratified by sex and correct answer

Item no.	Female	Male
1. Do you think osteoporosis is a silent disease?	187 (44.4%)	91 (58%)
2. Osteoporosis increase the risk of having fractures	396 (94.1%)	135 (86%)
3. Is previous fracture from imbalance or falling as a risk factor?	149 (35.5%)	63 (40.1%)
4. Is previous hip fracture a risk factor?	82 (19.6%)	28 (17.8%)
5. Is not eating calcium-rich foods a risk factor?	399 (94.8%)	144 (91.7%)
6. Do you consider a risk factor having a first or second degree family member diagnosed with osteoporosis?	150 (35.7%)	56 (35.7%)
7. Is lack of regular exercise a risk factor?	294 (70%)	113 (72%)
8. Early menopause are at higher risk of osteoporosis	322 (76.7%)	96 (61.1%)

Table 4. Knowledge of osteoporosis stratified by education degree and correct

Item no.	Below high school	High school	Diploma	Bachelor	Master	Doctorate
1. Do you think osteoporosis is a silent disease?	9 (37.5%)	51 (41.8%)	35 (63.6%)	160 (47.1%)	16 (66.7%)	7 (58.3%)
2. Osteoporosis increase the risk of having fractures	22 (91.7%)	111 (91%)	51 (92.7%)	313 (92.1%)	23 (95.8%)	11 (91.7%)
3. Is previous fracture from imbalance or falling -a risk factor?	6 (25%)	51 (41.8%)	20 (36.4%)	120 (35.4%)	8 (33.3%)	5 (41.7%)
4. Is previous hip fracture a risk factor?	3 (12.5%)	26 (21.3%)	7 (12.7%)	63 (18.7%)	6 (25%)	3 (25%)
5. Is not eating calcium-rich foods a risk factor?	21 (87.5%)	115 (94.3%)	50 (90.9%)	323 (95%)	23 (95.8%)	10 (83.3%)
6. One of first or second degree family member diagnosed with osteoporosis consider a risk factor	5 (20.8%)	37 (30.6%)	20 (36.4%)	130 (38.2%)	9 (37.5%)	4 (33.3%)
7. Is lack of regular exercise a risk factor?	15 (62.5%)	91 (74.6%)	40 (72.7%)	237 (69.7%)	16 (69.6%)	8 (66.7%)
8. Early menopause are at higher risk of osteoporosis	8 (33.3%)	77 (63.1%)	41 (74.5%)	261 (76.8%)	22 (91.7%)	10 (83.3%)

3.5 Knowledge of Osteoporosis Stratified by Age Groups and Correct Answer

Table 5 shows that the age group between 51-65 years old had the highest knowledge about osteoporosis.

Almost three quarters (73.7%) of them identify osteoporosis as silent disease, 36 (94.7%) knew that osteoporosis increase risk of fractures, 16 (42.1%), 8 (21.1%) and 15 (39.5%) recognized that previous fracture from imbalance or falling, previous hip fracture and diagnosed family member as risk factors, respectively.

Age group between 36-50 years old were able to identify three risk factors (94.3%), (78.7%) and (86.9%) which were not eating calcium-rich foods, luck of regular exercise and early menopause, respectively.

While age group 15-35 years old had the lowest knowledge about osteoporosis compare to other age groups. The two participants who are aged more than 65 years old had knowledge about osteoporosis regarding the risk of fractures, not eating calcium-rich foods a as well as lack of regular exercise, respectively.

3.6 Attitude towards Osteoporosis among Participants: (n=579)

Table 6 shows that 394 (68.1%) of participants have concern of having osteoporosis in a point of their lives and 122 (21.1%) have not.

Almost more than one quarter (65.6%) thought that they can influence the probability of having osteoporosis, while 91(15.7%) did not know. Lifestyle could affect the risk of having osteoporosis 404 (69.8%) thought that while 72 (12.4%) did not.

3.7 Practice of Osteoporosis among Participants

Fifty one of participants (8.82%) had measure their Bone Mineral Density (BMD), 23 (43.40%) of them knew that they have more than one risk factor and 20 (37.74%) measure it out of fear.

Five hundred twenty eight (91.18%) did not measure their BMD, 186 (35.29%) of them because they have no concern and 159 (30.17%) did not know that osteoporosis have test that detect it presence.

More than three quarter of participants (89.63%) did measure their (vitamin D) level. 491 (84.9%) did measure their blood calcium. As shown in (Table 7).

Table 5. Knowledge of osteoporosis stratified by age groups and correct answer

Item no.	15 - 35 years	36 - 50 years	51 - 65 years	More than 65 years
1. Do you think osteoporosis is a silent disease?	169 (40.6%)	80 (65.6%)	28 (73.7%)	1 (50%)
2. Osteoporosis increase the risk of having fractures	383 (92.1%)	110 (90.2%)	36 (94.7%)	2 (100%)
3. Is previous fracture from imbalance or falling- a risk factor?	152 (36.6%)	43 (35.2%)	16 (42.1%)	1 (50%)
4. Is previous hip fracture a risk factor?	78 (18.8%)	23 (19%)	8 (21.1%)	1 (50%)
5. Is not eating calcium-rich foods a risk factor?	391 (94%)	115 (94.3%)	35 (92.1%)	2 (100%)
6. One of first or second degree family member diagnosed with osteoporosis consider a risk factor	142 (34.2%)	48 (39.3%)	15 (39.5%)	1 (50%)
7. Is lack of regular exercise a risk factor?	280 (67.5%)	96 (78.7%)	29 (76.3%)	2 (100%)
8. Early menopause women are at higher risk of osteoporosis	280 (67.3%)	106 (86.9%)	31 (81.6%)	1 (50%)

Table 6. Attitude towards osteoporosis among participants (n=579)

Item no.	Yes	No	Neutral	Do not know
1. Do you have any concern of having osteoporosis in a point of your life?	394 (68.1%)	122 (21.1%)	63 (10.8%)	0 (0%)
2. Do you think you can influence the probability of having Osteoporosis?	380 (65.6%)	50 (8.6%)	58 (10.1%)	91 (15.7%)
3. Your lifestyle could affect the risk factor of having osteoporosis?	404 (69.8%)	72 (12.4%)	50 (8.6%)	53 (9.2%)

Table 7. Practice of osteoporosis among participants (n=579)

Item no.	Yes	No
1. Have you measure your BMD?	51 (8.82%)	528 (91.18%)
2. Have you measure vitamin D In blood?	519 (89.63%)	60 (10.37)
3. Have you measure blood calcium?	491 (84.9%)	88 (15.1%)

Slightly more than three quarter (89.01%) of respondent choose lack of awareness in community as a major barrier of treating osteoporosis, while 309 (53.93%) choose lack of advice from medical team, as shown in Fig. 1.

4. DISCUSSION

The National Osteoporosis Foundation describes osteoporosis as a 'silent disease' and it is a generic term used to define the reduction in mass and increased porosity of the skeleton that alter fracture risk. It is no longer confined to the growing older population but has implications for all age groups [10]. Hence increasing knowledge of osteoporosis should be a priority for future intervention programs in order to promote specific behavioral strategies for osteoporosis prevention [11]. The purpose of this study was to explore the extent of osteoporosis knowledge, attitude and practices among population of Saudi Arabia.

Only 48.19% of participants had known the meaning of osteoporosis, while higher proportions (87%) were obtained by [1]. Who conducted their study in Malaysia. Women are more likely to develop osteoporosis than men for 3 main reasons, first, women normally have a lower peak bone mass than men, second, women experience an accelerated loss of bone following the hormonal changes associated with menopause and third, women generally live longer than men so they continue to experience the bone loss associated with aging for a longer time [12], for these reasons women need to be more educated regarding osteoporosis especially before menopause. In this study 44.4% correctly define osteoporosis which was higher than findings of study (36.6%) in Egypt [13].

In this study female show high percent in knowledge of osteoporosis risk factors, not eating calcium-rich food (94.8%), lack of regular exercise (70%) and family history (35.7%) than other study that was conducted in Riyadh [14]. Only 60% identified low calcium intake as risk factors, lack of exercise was identified as a risk factor in 39% and only 22% identified family history of osteoporosis as risk factor.

Below high school participants show the lowest level of knowledge of osteoporosis and its risks in compare with other education degrees. The results of another study [15], That was conducted in UK; demonstrate that there is a low level of knowledge and awareness regarding the prevalence of osteoporosis and its associated risk factors among 16-18 year olds in full-time education. This suggests that this population is unlikely to make lifestyle choices which would reduce the risk of developing the disease. Targeted education programs are therefore needed and should be aimed at both improving knowledge and affecting health beliefs in a manner appropriate and appealing to this age group.

In this study knowledge about osteoporosis increased with increasing age. In particular, the 51 – 65-year-old participants demonstrated greater knowledge about osteoporosis and its impact on occurrence of fractures as well as risk factors. Similar result was found in another study in New Zealand that 40 – 49-year-old women demonstrated greater knowledge about the risks of being menopausal and having an ovariectomy [16].
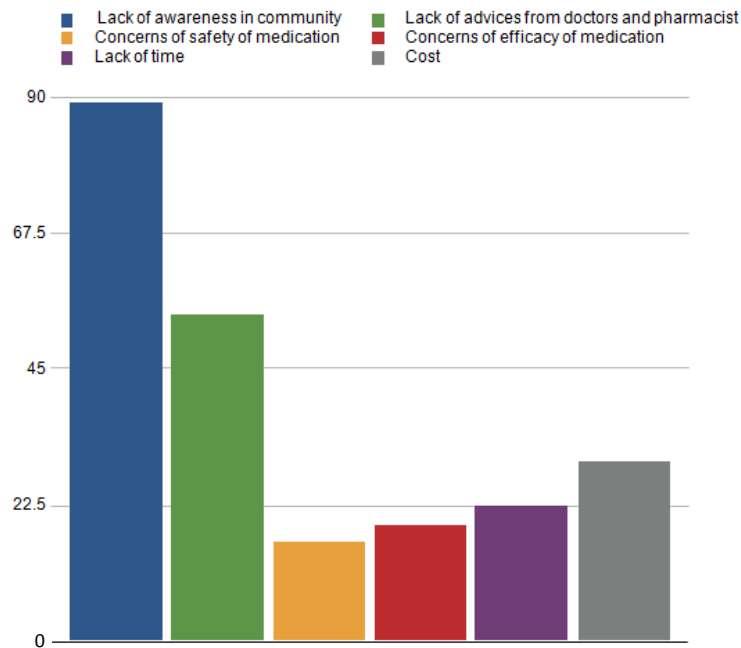
Fig. 1. Percentage of barriers of treating osteoporosis

Only 46.34% of current study participants knew the recommended daily intake (RDI) for calcium and 18.54% had known how much milk was required to meet the RDI. There was low awareness also of the recommended daily intake (RDI) for calcium and how much milk was required to meet the RDI in study in New Zealand [16].

More than half of these study participants 68.1% have a concern of having osteoporosis in a point of their lives. Less percentage (55%) was found in another study conducted in Malaysia [1].

Slightly more than two quarter (59.27%) strongly agreed that providing consultation in community pharmacies would protect society from osteoporosis- induce fractures. The same concept was implements in Jordan [17]; the median score for the knowledge of osteoporosis score (KOS) after reading the pharmacist-directed brochure was 78% and (KOS before education was 56% with significant difference in the KOS before and after reading the pharmacist-directed brochure) (78% vs. 56%; $p < 0.001$).

5. CONCLUSION

In conclusion, Osteoporosis knowledge considers low among Saudi population as this study reveals. Thus attitude and practices are also low towards this disease. This finding is similar to other studies done in the kingdom in different cities implying no serious actions were taken to improve this situation.

Ministry of Education should be involved in health education about osteoporosis and its related factors in schools or even could provide educational program via their curriculum to improve the awareness of this disease among students and thus ensuring that they received accurate information .

Health authorities should create program to upraise the awareness of the community for this important disease, especially at primary health care levels and community pharmacies.

A good knowledge and awareness of a disease are pre-requisites for success of preventive measures, modifications in life styles and treatment adherence.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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