ABSTRACT

Background: Pulmonary tuberculosis is a common and current health problem in Saudi Arabia. Public education and awareness are essential for the prevention of tuberculosis. This study aims at assessing the level of knowledge among people in Jeddah regarding this re-emerging disease.

Methods: A cross-sectional, self-administrated questionnaire-based study was conducted at three main shopping centers in Jeddah city, after pilot study testing. A structured questionnaire was developed to assess the basic knowledge about pulmonary tuberculosis which included demographic data, level of education, source and level of knowledge (basic facts) about pulmonary tuberculosis.

Results: The questionnaire was completed by 436 recruited subjects; 256 (58.7%) females, age ranged between 12 and 72 (mean 28.54 years; SD ±11.2); 165 (38.9%) were students and 154 (36.3%) were employees. The majority (73%) of candidates were relatively well educated or completed high school. 53.3% of the candidates assumed had sufficient knowledge regarding tuberculosis. 36% were unaware that lungs were the primary organ affected, over half (50.9%) denied it is an infectious disease, and almost half (47.4%) were unaware of effective treatment. The mean score of the level of knowledge for the whole group was 5.20 out of 11 (SD ± 2.95); 39% scored less than 4. Females scored better than males, 5.55 and 4.69 out of 11, respectively with a $p$ value of 0.003.

Conclusion: The data showed that public awareness regarding pulmonary tuberculosis was below expectation. Essential information about the disease was lacking even among well educated people, though female were found to be knowledgeable compared to males.

Keywords: Pulmonary tuberculosis; Public knowledge; Community; Jeddah.

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BACKGROUND

Tuberculosis (TB) is one of the main causes of morbidity and mortality worldwide. The World Health Organization (WHO) stated that one third of the world has been exposed to the TB pathogen[1]. Pulmonary tuberculosis is a common and current health problem in Saudi Arabia[2,3]. Although there is an increase in knowledge and infection control measures around the world, there are high numbers of cases in many parts of the world. The WHO reports incidence 9,471 (40/100,000), prevalence of 13,267 (55/100,000) and mortality rate of 1,099 (5/100,000) cases caused by tuberculosis in Saudi Arabia in the year 2004 alone[2]. Western region is considered as a highly endemic area; due to the rate of TB infection in Jeddah are about 64 cases per 100,000, while in Riyadh the rate is about 32 per 100,000. The higher rate in Jeddah may be related to the high number of pilgrims per year[4]. Many known factors make people susceptible to TB infection. Human Immunodeficiency Virus (HIV) infection is one of the main factors as many of TB patient are HIV positive[5]. Diabetes is an important factor as well[6]. A study done by Davies et al. revealed that smoking more than 20 cigarettes per day increases the susceptibility to get infected by four folds[7]. Other illnesses that have been attributed to TB infection are chronic lung disease, end-stage renal disease, Hodgkin lymphoma, malnutrition and alcohol consumption[8]. Tuberculosis is considered as a social disease, which explains the importance of the social factors in TB transmission. Social factors involve illiteracy, low socioeconomic status, poverty, poor housing, overcrowding and large size families[9]. Knowledge about TB has shown to increase compliance to treatment among TB patients and an increase cure rate[10]. In addition, more knowledge and awareness may improve the control measures that will lead to the decrease of the transmission of the disease[11]. Although public education and awareness is essential for the prevention and lowering the spread of tuberculosis, many studies revealed that there are limited information and many misconceptions about this infectious disease[12,13]. Therefore, intensive educational program may interfere with spread of this preventable disease. The main aim of this study is to assess the level of public general knowledge regarding pulmonary tuberculosis in the city of Jeddah.

METHODOLOGY

After obtaining ethical approval from the committee of ethics at King Abdulaziz University, pilot study was carried out on 30 persons in order to examine the face validity, and to ensure accuracy and simplicity. However, some questions were modified. The results of this pilot study were not included in the results.

A cross-sectional questionnaire-based study was conducted through an educational campaign during the period of March 1st to April 1st 2010 at three main shopping centers in Jeddah city whereby a convenient sample was taken. Target population was Saudi general public at shopping centers. Exclusion criteria were non-Saudi and people less than 12 years old. A structured self-administrated questionnaire was developed to assess the basic knowledge about pulmonary tuberculosis after obtaining participant permission. This questionnaire was translated into Arabic and took approximately 10 minutes to complete. Questionnaires were completed during face-to-face interviews conducted by volunteer medical students and informed consent was obtained from each study participant. The questionnaire consisted of three sections: Section one included demographic data, working status, level of education, income and source of knowledge. Section two aimed to test people’s knowledge through eleven basic questions about the disease including primary organ affected, causative agent, mode of transmission, common symptoms (fever, weight loss, cough and hemoptysis, fatigue, dyspnea and anorexia), factors that activate the disease, and availability of treatment. Section three inquired about sources of knowledge, whether participants believe they have sufficient information or if more information about the disease is needed. By using Guttman’s split-half coefficient test, the reliability of questions regarding knowledge about TB was 0.60.

Lastly, a scoring system was designed to assess the level of participants’ knowledge. This scoring system is based on participants’ responses to the 11 inquires in section 2 of the questionnaire mentioned above. The levels of knowledge were divided into low (score ranging from 0-4), intermediate (5-8) and high (score of 9-11). All data were verified, coded and analyzed using the Statistical Package for the Social Sciences (SPSS) software package, version 16. Data were presented as mean and standard deviation for quantitative variables. Chi-square test was used to compare knowledge and different variables; “student’s” t-test was used to compare the mean age and mean knowledge score between genders.

RESULTS

Total number of participants was 436. Of them 256 (58.7%) were females with the mean age of 28.54 year (SD ± 11.2) ranged between 12 and 72. The mean ages between male and female was relatively the same, 28.71 (SD ± 11.56) and 28.42 (SD ± 10.49), respectively. Gender, mean age, occupation and level of education between genders are shown in Table 1. The majority of the subjects were relatively well educated, since 193 (45.8%) are university graduates and 135 (32.1%) only completed their high school education. Regarding participant’s monthly income; most of them had less than USD1,500, and from USD1,500 to USD4,500 as monthly income, 165 (46.7%) and 140 (39.7%), respectively. From the total population, 225 (53.3%) thought that they had enough information about TB. The most common sources of their information were the media, public education and schools; 119 (27.3%), 107 (24%) and 103 (23.6%), respectively. More than two-thirds, 292 (68.1%), knew that the lungs are the primary affected organ by TB, whereas the remaining
studies. The majority of participants (200/436, 49.1%) knew that tuberculosis is caused by bacteria, but only 218 (51%) were aware that tuberculosis is an infectious disease. Two-thirds (271/436, 65.8%) correctly reported that airborne is the mode of transmission, while the remaining third thought that tuberculosis is transmitted sexually, via cutaneous contact, hereditary disease, or do not know.

Subjects’ responses regarding clinical presentation of tuberculosis are shown in Table 2. However, 145 (33.5%) of the study population admitted that tuberculosis is reactivated due to immune suppression. Almost half of the participants, 287 (47.7%), were not aware that there is an effective treatment for tuberculosis. Their responses were either no effective therapy, only symptomatic treatment, or do not know. All subjects’ correct answers of the 11 questions are demonstrated in Table 2.

Table 1. Demonstration of study population (n=436) regarding age, occupation and education between gender.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Male N (%)</th>
<th>Female N (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>180 (41.2%)</td>
<td>256 (58.7%)</td>
<td>436</td>
</tr>
<tr>
<td>Mean Age (± SD*)</td>
<td>28.71 (±11.564)</td>
<td>28.42 (±10.939)</td>
<td>28.54 (±11.2)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>104 (24.5%)</td>
<td>50 (11.8%)</td>
<td>154</td>
</tr>
<tr>
<td>Students</td>
<td>61 (14.4%)</td>
<td>104 (24.5%)</td>
<td>165</td>
</tr>
<tr>
<td>Housewives</td>
<td>0 (0%)</td>
<td>72 (17%)</td>
<td>72</td>
</tr>
<tr>
<td>Without a job (unemployed)</td>
<td>9 (2.1%)</td>
<td>24 (5.7%)</td>
<td>33</td>
</tr>
<tr>
<td>Level of Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>12 (2.9%)</td>
<td>28 (6.7%)</td>
<td>40</td>
</tr>
<tr>
<td>High School</td>
<td>52 (12.4%)</td>
<td>83 (19.7%)</td>
<td>135</td>
</tr>
<tr>
<td>University</td>
<td>78 (18.5%)</td>
<td>115 (27.3%)</td>
<td>193</td>
</tr>
<tr>
<td>Diploma</td>
<td>18 (4.3%)</td>
<td>15 (3.6%)</td>
<td>33</td>
</tr>
<tr>
<td>Higher Education</td>
<td>12 (2.9%)</td>
<td>8 (1.9%)</td>
<td>20</td>
</tr>
</tbody>
</table>

* SD=Standard Deviation

Table 2. Correct answers of participants (n=436) to simplified form of questions on knowledge of tuberculosis (TB) and differences between genders.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Male N (%)</th>
<th>Female N (%)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lungs are the primary organ affected</td>
<td>103 (58.9%)</td>
<td>189 (74.4%)</td>
<td>0.015</td>
</tr>
<tr>
<td>2. The cause of TB is bacterial in origin</td>
<td>84 (48.6%)</td>
<td>126 (49.4%)</td>
<td>0.209</td>
</tr>
<tr>
<td>3. Main mode of transmission is airborne</td>
<td>94 (57%)</td>
<td>177 (71.7%)</td>
<td>0.005</td>
</tr>
<tr>
<td>4. TB may be activated by immunodeficiency</td>
<td>50 (30.9%)</td>
<td>88 (37.1%)</td>
<td>0.35</td>
</tr>
<tr>
<td>5. Availability of effective treatment</td>
<td>80 (51%)</td>
<td>124 (53%)</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Appropriate symptoms of Tuberculosis include:

6. Fever                                       | 72 (40%)   | 113 (44.1%)  | 0.39    |
7. Weight loss                                  | 60 (33.3%) | 112 (43.8%)  | 0.028   |
8. Productive cough & Hemoptysis                | 107 (59.4%)| 186 (72.7%)  | 0.004   |
9. Dyspnea                                      | 67 (37.2%) | 105 (41%)    | 0.43    |
10. Loss of appetite                            | 61 (33.9%) | 91 (35.5%)   | 0.72    |
11. Fatigue                                     | 66 (36.7%) | 111 (43.4%)  | 0.16    |
Although there was no statistically significant difference between genders in income or educational level, females’ level of knowledge was better than males as shown in Table 3 and Figure 1. Hence, when using the scoring system for level of TB knowledge, the mean score for the study population was 5.20 out of 11 (Table 3). Again the mean score for the female participants was significantly higher than the male (5.55 (SD ± 2.817), 4.69 (SD ± 3.086), respectively, p value: 0.003). However, 170 (39%) scored less than 4 and only 63(14.4%) scored higher than 9. Figure 1 demonstrates subjects’ level of knowledge score in bar graph.

**DISCUSSION**

This study showed that only half (53.3%) of the study population believed they have some degree of fair knowledge about tuberculosis. Using scoring system, the level of knowledge for the whole group was only 5.20 out of 11 (Table 3). Although the overall score for the whole group may appear sufficient, 39.5% scored less than 4 out of 11, 36% did not know that lungs were the primary affected organ, about half (50.9%) denied that it is an infectious disease, and more than 47.4% were not aware of an effective anti-tuberculosis treatment. These disappointing findings were despite the fact that majority are considered educated, since 193 (45.8%) are university graduates and 135 (32.1%) completed their high school education, which would indicate the need for general awareness campaign about this disease. Interestingly, our study showed females that had more knowledge about tuberculosis compared to males. This contrasts with similar studies performed in other countries such as China[14] and Sudan[15] for which showed that males had better knowledge regarding tuberculosis than females[16]. Hence, the discrepancy between our study and these studies could not be explained, but could be related to different methodology or different educational level of the study population. In fact, most of the studies in the literature about knowledge and perception were done among TB patients and health seeking people. As most of our candidates are well educated, the increased knowledge about the disease among females may be just a reflection of the fact that females are usually more

<table>
<thead>
<tr>
<th>Level of Knowledge</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (0 – 4)</td>
<td>170 (39.0%)</td>
<td>85 (47.2%)*</td>
<td>85 (33.2%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Intermediate (5 - 8)</td>
<td>203 (46.6%)</td>
<td>70 (38.9%)</td>
<td>133 (52%)</td>
<td>0.01</td>
</tr>
<tr>
<td>High (9 – 11)</td>
<td>63 (14.4%)</td>
<td>25 (13.9%)</td>
<td>38 (14.8%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Mean Score</td>
<td>5.20 (SD ± 2.958)</td>
<td>4.69 (SD ± 3.086)</td>
<td>5.55 (SD ± 2.817)</td>
<td>0.003</td>
</tr>
</tbody>
</table>

**Figure 1.** Level of knowledge shown in graph.

**Table 3.** Levels of knowledge of the study population (Scale ranges from 0 - 11). Showing that females’ score was better than male with significant p value (0.003).
keen and studious than males.

In our study, the majority (68.1%) of candidates knew correctly that the lungs are the main organ involved in TB infection, which is close to that of a Nepalese study were (58%) of study population knew that correctly\textsuperscript{15,16}. In addition, nearly half (49.1%) of the candidate knew that TB is caused by a bacteria and 65.8% knew that it is an infectious disease transmitted by droplets which is actually higher than that reported from Nepalese and Sudan (50% and 40.4%, respectively)\textsuperscript{15,16}. Few patients knew other ways of transmissions. It is interesting to know that only 34.6% of the participant knew that there is a relationship between TB and the immunodeficiency. In Nepalese population, only 16.6% of the study candidates were aware that TB is a common opportunistic infection among HIV patients\textsuperscript{15}. Comparing to Chinese people (73.6%), only 52% of our study population knew that TB is a curable disease.

In our study, many of the candidates were aware of TB symptoms such as coughing with bloody sputum (67.2%), fever (42.4%) and weight loss (39.4%). Such awareness of TB clinical presentation may help in controlling the spread of this highly infectious and epidemic disease by proper suspicion, and hence, early medical consultation. Sociological studies in India have shown that most pulmonary TB patients have one or more chest symptoms and the majority seeks early medical advice on their own\textsuperscript{15}. This difference in awareness between Saudi Arabia and other parts of the world could be related to different sampling methods, different level of literacy or the presence of health awareness campaigns. The best way to gain knowledge about medical disease, according to participant in our study, is through public education (71%), by emphasizing the important role of health administration, and by the media in increasing the health awareness by public health campaign. Despite the positive results this study has revealed, it has several limitations. Although the sample size of this study was convenient, however, better sample randomization may further eliminate bias speculate. Furthermore, the sample was taken from three shopping centers in one city in Saudi Arabia and therefore, not a fair representative of the Jeddah or the whole country. In addition a self-developed invalidated questionnaire was used which may affect the accuracy of the collected data. Using a validated questionnaire would give more robust results in the future. Further study is recommended to develop a general guideline for developing awareness campaign and health education for TB patients.

In conclusion, our data showed that public awareness regarding pulmonary tuberculosis was under expectation. Essential information was lacking even among well educated people. Therefore, more efforts to address this problem are crucial in order to help in preventing this most fatal infectious disease worldwide. This is probably by designing frequent health educational campaign to increase community general awareness about the disease, which is crucial to the control of the infection.

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