

# Tuberculosis: Awareness among Students in a Saudi University

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## Abstract

**Background:** Knowledge plays a vital role in influencing the behavior and practices of individuals. Tuberculosis (TB) is a major public health problem. Our objective is to identify the extent of awareness about TB among King Saud University students, and to compare knowledge about tuberculosis amongst different University tracks. **Methods:** This study was conducted using a cross-sectional approach including 530 students in three different academic tracks: Health, Scientific, and Humanitarian tracks. For data collection, a structured questionnaire was developed through revision of the literature which contained three different parts; demographic data of subjects, knowledge about TB and attitude toward TB. **Results:** The established scoring system revealed a poor grade of knowledge at 51.4%. Tuberculosis knowledge was significantly higher amongst the track of Health colleges (46.7% compared with 27.2% for the track of Science and 26% for the track of Humanitarian studies). However, some of the issues were answered fittingly in higher magnitude by the two other non-health tracks; there was no significant difference in gender-specific awareness level (48% for both). **Conclusion:** Although the Health track has better knowledge in general (46.7%), the level of awareness of Tuberculosis is poor among King Saud University students. Moreover, the level of awareness differs among the three tracks, which are health, humanitarian, and science. The health track showed the highest level of awareness.

## Keywords

Tuberculosis, King-Saud-University Students, Awareness, Knowledge, Attitude

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## 1. Introduction

Tuberculosis (TB) is a major public health concern in Saudi Arabia [1]. It is caused by various strains of myco-

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bacteria, usually *Mycobacterium tuberculosis* [2]. It has re-emerged as a community health problem in the 1980's, worldwide. It has been estimated by the World Health Organization (WHO), that about 5000 people die of the disease and 20,000 are becoming infected each day [3]. The incidence rate (per 100,000 populations) has been decreasing by 1.3% per year since 2002. Since the year 2006, the prevalence of TB cases per year has been falling. If these trends continue, the incidence will be falling and the target of the MDG will be reached by 2015. Even though the prevalence of tuberculosis is decreasing worldwide, it is doubtful to reach a 50% reduction of tuberculosis compared with 1990 as Stop TB partnership estimated [4]. In Saudi Arabia, the total number of reported tuberculosis cases in the year 2008 was 3918 cases in a population of approximately 24,807,273 individuals' [4]. It affects mainly young and middle-aged individuals; most of them aged between 15 and 44 years old. The incidence of all cases was estimated at 15.8 for every 100,000, and the estimated prevalence of all forms of TB cases was 65/100,000 population/year [4]. Public awareness is essential for the reduction of both mortality and morbidity of TB [5]. It is well established that good public awareness correlates well with the early detection of disease. Knowledge plays a vital role in influencing the behavior and practices of the individuals. Early detection and diagnosis of TB can cause a decrease in TB mortalities and occurrence [6]. TB is a disease, which is stigmatized by the community leading to social rejection [7]-[9].

Literature review does not reveal previous studies assessing tuberculosis public awareness conducted in Saudi Arabia. Therefore, the objective of this study is to assess the extent of awareness amongst King Saud University students regarding TB.

## 2. Materials and Methods

### 2.1. Study Design and Sample Size

This study was conducted using a cross-sectional approach targeting students from King Saud University (KSU) including different academic tracks: Health, Scientific, and Humanitarian tracks. Sample size was determined assuming the prevalence of poor knowledge of TB equals 30% and degree of precision = 0.05. A stratified random sampling technique was used to recruit the respondents. To compensate for non-responders, 32% were added, which yielded a total sample of 530. The stratification was done according to the tracks and colleges. Proportionate allocation method was used to determine the number of participants from each college. Ethical approval of the study protocol was obtained from college of medicine ethical committee (IRB). Letter of study approval from the college of medicine was sent to track administrators

### 2.2. Sampling and Data Collection

For data collection, a structured self-administered questionnaire was developed through revision of the literature it contained three different parts; demographic data of subjects, e.g. demographic variables; gender, and age; knowledge about TB and attitude toward TB\*. The questionnaire was tested for validity and reliability. The participants completed the questionnaires through self-administration. Questionnaires were distributed according to the number of students of the three-abovementioned tracks. The health track included colleges of medicine, dentistry, and pharmacy, College of science, college of business and administration, college of engineering and college of computer and information sciences within the track of science colleges, college of law and political sciences, college of languages, college of education and college of literature within the track of humanitarian colleges. TB-specific variables e.g. etiology, mode of spread, contagiousness, signs and symptoms, etc, known TB patients will be excluded from the study. SPSS software was used in data tabulations and analysis [10]. Quantitative continuous variables were compared using independent t-tests. Chi-square/Fisher's exact test was used for categorical variables. A score of awareness level was made and implemented on two stages. In the first stage, data for assessing knowledge were scored as "1" for correct answers and "0" for false ones. In the second stage, the total score were classified into two separate groups' *i.e.* poor and good knowledge. Median was used as a threshold for grading knowledge of Tuberculosis. The group of good knowledge resembled participants who scored the median and above. On the other hand, those who scored less than the median were considered the poor knowledge group.

## 3. Results

### 3.1. Demographic Data

Five hundred thirty questionnaires were distributed to King Saud University students; 499 completed the ques-

tionnaires (94%), 347 (69.5%) males and 152 (30.5%) females. The sample included the three tracks: Colleges of Health, Colleges of Science, and Humanitarian colleges (21.2%, 24.4%, and 53.7%, respectively.) The mean age of participants was  $21.54 \pm 2.06$  years. Smokers were 14.2%, and the ex-smokers were 3.4% (Table 1). 83.4% of the participants have heard about tuberculosis. The sources of the knowledge were by television (37.1%), internet (29.5%), newspaper (21.6%), health brochures (24.4%), a family member (19.0%), and friends (15.8%) (Table 2).

**Table 1.** Demographic characteristics of King Saud University students who participated in the study.

Characteristics	Frequency	Percent
<b>1-Gender</b>		
Male	347	69.5
Female	152	30.5
Total	499	100%
<b>2-Age <math>\bar{x} \pm SD</math></b>		
	21.544 $\pm$ 1.058	
<b>3-Marital status</b>		
Single	461	93
Married	34	6.8
Divorced	1	0.2
Total	496	100%
<b>4-Tracks</b>		
Science colleges	122	24.6
Health colleges	106	21.4
Humanitarian colleges	268	54
Total	496	100%
<b>5-Residence</b>		
Riyadh	487	98.5
Outside Riyadh	7	1.5
Total	494	100%
<b>6-GPA <math>\bar{x} \pm SD</math></b>		
	3.72 $\pm$ 0.75	
<b>7-Mothers' educational level</b>		
Less than secondary	134	30.2
Secondary	112	25.2
University	181	40.8
Post-graduate	17	3.8
Total	444	100%
<b>8-Fathers' educational level</b>		
Less than secondary	70	16
Secondary	97	22
University	209	47
Post-graduate	68	15
Total	444	100%

GPA: Grade Point Average;  $\bar{x}$ : Statistical mean; SD: Standard deviation.

**Table 2.** Source of knowledge about tuberculosis among KSU students.

Source of knowledge	Table column head	
	Frequency	Percent
Television	185	37.1
Internet	147	29.5
Health brochures	122	24.4
Newspaper	108	21.6
Family member	95	19.0
Friends	79	15.8
Others	5	12

### 3.2. Knowledge about Tuberculosis (TB)

The proportion of participants who know someone that has been infected with TB was 14.0%. Around 63.0% recorded that tuberculosis was infectious, while only 5.0% thought TB is hereditary. About 68.1% of participants have chosen lungs as the most commonly affected organ by tuberculosis. Other organs that may be infected as liver, kidney, bone, spine, testicles, brain, and ears were 19.2%, 14.4%, 10.8%, 8.8%, 8.2%, 6, 8%, and 2.2%, respectively.

Around half of the participants have picked virus as the cause of tuberculosis (46.3%), however 44.3% of them concomitantly selected bacteria. Reported methods of TB spread were cough-air (57%), unclean food or water (19%), sexual contact with TB patient (18.6%), public areas (11.6%), hereditary (6.6%), whereas (20.6%) did not know. Most participants (69.3%) have selected immuno-compromise as a risk-factor for developing Tuberculosis. Followed by, overcrowding (30.9%), smoking (27.7%), illegal drug use (14.2%), genetic predisposition (11.8%), and alcohol (8.6%) (**Table 3**).

A total of 335 participants (67.1%) considered TB is a preventable disease. Regarding method of the prevention, 79.7% of them believe that TB is prevented primarily by vaccination, and 20.3% of the participants reported that TB could be prevented by other methods.

Regarding Symptoms of TB, (47.9%) of the participants considered coughing blood as a symptom of TB, (44.9%) agreed that productive/prolonged cough is a symptom of TB. In addition, other symptoms reported, include constipation (37%), night sweating (22%) and weight loss (3.6%). Symptoms such as chest pain, fever, pallor, appetite loss, diarrhea, itching, and impotence were agreed upon being symptoms of TB by 35.7%, 31.5%, 30.3%, 22%, 16%, 14%, and 5.2%, respectively.

As regards to the duration of treatment of TB, 295 participants (59%) did not know the duration of TB treatment. 90 participants (18%) answered with 6 - 9 months, and 63 (12.6%) chose 1 - 5 months as the duration of treatment.

For side effects of TB treatment, 218 (43.7%) participants do not know side effects of treatment. 123 participants reported jaundice (24.6%) while Dizziness was reported by (23.6%). 71 participants (14.2%) responded that red-orange urine was a possible side effect (**Table 4**).

Concerning the complications of TB, 197 (39.5%) reported that death is a complication of TB. 189 (37.9%) chose relapse. Furthermore, 175 participants (35.1%) believed that generalized TB was a complication of TB. Drug resistance, bleeding, and cancer were reported by 16.8%, 22.8%, and 4.2%, respectively.

### 3.3. Score Grading System

Grade of knowledge in students of King Saud University, according to the median, 179 (51.4%) participants have poor knowledge and 169 (48.6%) have good knowledge. The maximum score was 19 out of 21, and the minimum was one. The mean was  $9.54 \pm 3.93$  and a median was 9.0.

**Table 5** showed that approximately half of all participants of both genders had poor grade of knowledge. The mean age of people who had poor knowledge was  $21.56 \pm 2.01$  years. While the mean age of participants with good knowledge was  $21.44 \pm 1.82$  years with no statistical significance ( $P = 0.284$ ), in-between 51.4% of participants achieved poor grade of knowledge, with 90% of them being single, which is not statistically significant

**Table 3.** Perception of King Saud University students regarding risk factors of tuberculosis.

Risk factor	Table column head	
	Frequency	Percent
Smoking	138	27.7
Overcrowding	154	30.9
Genetic predisposition	59	11.8
Immuno-compromised	346	69.3
Alcohol	43	8.6
Illegal drug use	71	14.2

**Table 4.** Awareness of KSU students regarding duration and side effects of TB treatment.

Treatment characteristic	Table column head	
	Frequency	Percent
<b>Duration</b>		
1 - 5 months	63	12.9
6 - 9 months	90	18.4
10 - 12 months	39	8.0
Don't know	295	60.5
Total	487	100%
<b>Side effect</b>		
Jaundice	123	24.6
Dizziness	118	23.6
Red-orange urine	71	14.2
Vomiting	89	17.8
Muscle/joint pain	62	12.4
Itching	40	8.0
Diarrhea	41	8.2
Don't know	218	43.7

( $P = 0.062$ ).

Regarding the grade of knowledge in the different colleges of King Saud University, 9.2% of the participants in Health Colleges had a poor knowledge. In contrast, 47.12% and 74.5% of the participants in Scientific Colleges and Humanitarian Colleges, respectively, had a poor knowledge with statistical significance in-between ( $P < 0.05$ ). Considering the maternal level of education, 8.4% of the participants whom mothers had a post-graduate degree had poor knowledge, while 45.5% with a mother's education of a graduate degree had a poor knowledge. As regards the father's education and grade of knowledge, 28% of participants with father's post-graduate degree had a poor knowledge. 41.5% with father's pre-high-school degree had a poor knowledge. 50.4% with father's graduate degree had a poor knowledge. 62.4% of the participants with father's high school degree had a poor knowledge, which is statistically significant ( $P < 0.05$ ). As for smokers, 52.9% of the smokers had a poor knowledge. While 51.2% of the non-smokers had a poor knowledge and 44.4% of the ex. Smokers had poor knowledge, this was not statistically significant ( $P = 0.894$ ).

## 4. Discussion

### 4.1. Social Demographic Characteristics

Tuberculosis remains the second most common cause of death due infectious diseases after HIV/AIDS. It con-

**Table 5.** Demographic characteristics and grade of knowledge in KSU students.

Characteristics	Grade of knowledge			P
	Poor n (%)	Good n (%)	Total	
<b>1-Gender (398)</b>				
Male	121 (67.5)	114 (67.4)	235	0.90
Female	58 (32.4)	55 (32.5)	113	
<b>2-Age <math>\bar{x} \pm SD</math></b>	21.56 $\pm$ 2.08	21.44 $\pm$ 1.81	21.50 $\pm$ 1.95	0.28
<b>3-Marital status (346)</b>				
Single	160 (89.8)	160 (95.2)	320	0.62
Married	18 (10.1)	7 (4.1)	25	
Divorced	0	1 (0.05)	1	
<b>4-Tracks (347)</b>				
Science colleges	41 (23)	46 (27.2)	87	<b>&lt;0.001</b>
Health colleges	8 (4.4)	79 (46.7)	87	
Humanitarian colleges	129 (72.4)	44 (26)	173	
<b>5-GPA <math>\bar{x} \pm SD</math></b>	3.61 $\pm$ 0.72	3.98 $\pm$ 0.71	3.79 $\pm$ 0.74	0.108
<b>6-Mothers' educational level</b>				
Less than secondary	45 (30.2)	37 (24.1)	82	<b>0.009</b>
Secondary	43 (28.8)	33 (21.5)	76	
University	60 (40.2)	72 (47)	132	
Post-graduate	1 (0.6)	11 (7.1)	12	
<b>7-Fathers' educational level</b>				
Less than secondary	17 (11.5)	24 (15.1)	41	<b>0.002</b>
Secondary	43 (29.2)	26 (16.4)	69	
University	73 (49.6)	72 (45.5)	145	
Post-graduate	14 (9.5)	36 (22.7)	50	
<b>8-Smoking status (345)</b>				
Yes	27 (15.2)	24 (14.2)	51	0.894
No	146 (82.4)	139 (82.7)	285	
Ex. smoker	4 (2.2)	5 (2.9)	9	

stitutes a major burden on health care systems across the globe [11]. In the meanwhile, no major recent advances in anti-TB drug development or research efforts showed any immediate meaningful reduction of Tuberculosis cases. Tuberculosis in Saudi Arabia affects mainly young and middle-aged individuals [4]. The World Health Organization has called for campaigns to increase awareness of TB [1] [12].

The current study's respondents with parents having secondary or higher education had significantly higher score on general knowledge on TB. This showed education was an important determinant of general knowledge on TB. The study is supported by other studies namely Westaway M.S [7] and Kim *et al.* [13].

As predicted, tuberculosis knowledge was significantly higher amongst the Health track colleges compared with the two other tracks. This can be explained by the fact that health colleges most probably have had studied

TB at some point in their curriculum. This variability in knowledge about TB should point out the populations in which proper health measures are put into appropriate practice.

The current finding is consistent with other analogous studies worldwide [14]. In the present work, an implementation of a validated scoring system was made. This study compared men and women, and found, in general, that TB awareness level was similar. Similar findings were reported by other studies [8] [13] [15].

## 4.2. Knowledge about Tuberculosis (TB)

Current overseas studies on awareness of people regarding tuberculosis have revealed both similar and contrasting aspects of the awareness level. For example, regarding the nature of tuberculosis, one study in Rajasthan, India has revealed that only six (1.6%) out of 376 participants knew that tuberculosis is caused by a germ, while 206 (54.8%) had the misconception that tuberculosis is a hereditary disease [9]. In addition, a study conducted in Vietnam stated that 6071 (50%) out of 12143 had the same misconception that tuberculosis is also a hereditary disease [16]. In contrast, our study showed that only 33 (6.6%) out of 499 participant had the same misconception of tuberculosis being hereditary, while a larger proportion 383 (76.7%) knew that it is spread through air and unclean food. This large dissimilarity can be linked to the different educational systems and the abundance of tuberculosis awareness programs held in the vicinity in addition to the high prevalence of TB in South East Asia and occurrence of more than one case within the family.

Concerning the symptoms of tuberculosis, A study that was conducted in Sabah, Malaysia revealed that 91 (46.2%) and 73 (37.1%) out of 197 knew that tuberculosis is associated with hemoptysis and cough, respectively [8]. Likewise, a study that was conducted in China where only 10453 (15.1%) out of 69253 participants knew that prolonged cough is associated that tuberculosis [15]. Moreover, a study that was conducted in Rajasthan, India showed that 90 (23.9%) out 376 participants knew chest pain is a symptom of tuberculosis [9]. However, in another worldwide internet survey with a sample size of 564, around 49% reported cough as the commonest symptom of TB [17]. Compared to our study, 239 (47.9%) and 224 (44.9%) out of 499 participants knew that cough with blood and prolonged cough without blood, respectively, are symptoms of tuberculosis. Around one third knew that chest pain is associated with tuberculosis. It is evident that the knowledge in our subjects is slightly higher than some other countries. This difference might be attributed to the stereotypical stigmatization about tuberculosis in Saudi Arabia. In addition, in comparison to the study in China, the large difference in knowledge might be because they included only cough as a symptom of TB [15].

A population wise difference is noted in the three studies of Rajasthan, India and Sabah, Malaysia, and China. The studies included similar age groups as ours, except for the added recruitment of younger (<20) respondents in the China [15] and Rajasthan studies [9]. They included individuals in older age groups, the highest being aged 65 years old [8] [9] [15]. This can explain the slight unlike findings in this study.

While the great majority of the respondents thought that TB is treatable and can be cured by modern medicine, one-fifth of the respondents knew the correct duration for treatment of TB. This misconception about the treatment duration of TB in our study requires appropriate educational approaches.

## 5. Conclusion

This study concludes that the level of awareness of Tuberculosis is poor among King Saud University students. It differs in the three university tracks, which are health, humanitarian, and science. Furthermore, according to the used scale, in both male and female sections, the health track has shown the highest level of awareness and the second highest is the science track, and, the humanitarian track has the lowest level of awareness overall.

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