



# Assessment of knowledge, attitudes and practices regarding tuberculosis among final year students in Yazd, central Iran

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Received 3 August 2013; received in revised form 2 September 2013; accepted 3 September 2013

Available online 21 October 2013

## KEYWORDS

Knowledge;  
Attitude;  
Practices;  
Tuberculosis;  
Medical students

**Abstract** Tuberculosis (TB) remains a global health problem. Treatment and prevention of TB has shifted from inpatient to outpatient settings. A report from the World Health Organization has emphasized educational strategy to ensure students graduate with the appropriate knowledge, skills, and attitudes essential to the effective management of TB. The objective of this study was to determine the level of knowledge, attitudes and practices among medical students.

The survey was done from 2012 to 2013. Knowledge, attitudes and practices were assessed regarding tuberculosis with a questionnaire.

Knowledge mean score of students was  $16.13 \pm 2.06$  and Attitude score was  $36.08 \pm 3.76$ , Knowledge and attitude levels of students were moderate to high in the majority of them. Practice score of the study subjects was  $22.77 \pm 4.95$ , 11.9% of students had poor practice level. 43% did not know that a sputum smear is the most important method used for diagnosis of TB. Two-thirds of them did not know the distance that should be kept from contagious patients. Half of them believed that the BCG vaccination has no role in the prevention of TB.

This study concluded that more efforts should be made to improve the knowledge of students regarding TB transmission and the role of sputum smear in diagnosis. The importance of the BCG vaccination should be emphasized.

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<http://dx.doi.org/10.1016/j.jegh.2013.09.003>

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## 1. Introduction

Tuberculosis (TB) remains a global health problem. In 2011, there were an estimated 8.7 million new cases of TB (13% co-infected with HIV), and 1.4 million people died from TB. Between 1995 and 2011, 51 million people were successfully treated for TB in countries that had adopted the WHO strategy, saving 20 million lives [1]. From several years ago, treatment and prevention of TB have shifted from inpatient to outpatient settings. In Iran much of the care is provided by general physicians in public health departments and supervised by infectious disease specialists and some by private practitioners. It is clear that for a TB control program to be successful, clinicians should acquire sufficient knowledge and provide appropriate practice essential for the management of TB [2]. The available literature shows considerable variability in the prevention, evaluation, and treatment strategies used by physicians worldwide [3–5]. A report released by the World Health Organization emphasized “the importance of undergraduate training in tuberculosis and outlined a comprehensive educational strategy to ensure students graduate with the appropriate knowledge, skills, and attitudes essential to the effective management of tuberculosis [6].” There are concerns that physicians still make frequent errors in TB treatment [7].

The objective of this study was to determine the level of knowledge, attitudes, and self-reported practices involving transmission, diagnosis, treatment options, isolation precautions and prevention among medical students before they got involved in the treatment of TB to identify defects and try to correct them.

## 2. Method

A cross-sectional survey was done during a 6-month period from October 2012 until April 2013 at Shahid Sadoughi University-affiliated, 350-bed teaching hospitals in Yazd, Iran. The city of Yazd is located in a province in the center of Iran. A questionnaire was prepared by an infectious disease specialist and a final year medical student adopting Iranian guidelines for the control of TB (2nd edition) and previous similar studies [8]. Questionnaires included limited demographic information and questions about knowledge and items about attitudes and practices. Knowledge was assessed with 21 questions on general knowledge, transmission, diagnosis and treatment of TB. Attitude and practice items were based on Iranian guidelines for

the control of TB and the HICPAC guideline for isolation precautions in hospitals [9]. Attitude was assessed with 9 and practice with 7 items. The questionnaire was administered to all final-year medical students during their clinical rotations. All final-year medical students had exposure to active TB patients and had attended at least two lectures on tuberculosis. Exposure to an active TB case was defined as the student’s report of having examined at least one patient with active pulmonary TB. The institution surveyed by this study was the Shahid Sadoughi Medical University of Yazd. Students were asked to answer without referring to any resources for responding to the questions. Participation was on a voluntary basis and the questionnaire was anonymous. Ethical clearance was obtained from the University Ethics Committee.

### 2.1. Analysis

Attitudes and practices were assessed on a 5-point, Likert-type scale. Completely agree (5 points), agree (4 points), no difference (3 points), disagree (2 points), and completely disagree (1 point) were the options for attitudes, whereas always (4 point), often (3 point), sometimes (2 point), rarely (1 point), and never (0 points) were the options for practices. Correct responses to knowledge items were assigned a score of 1. Knowledge, attitude, and practice items were analyzed for mean scores with standard deviations. For evaluation of effect of gender on scores of knowledge, attitude, and practice, a non-parametric test was used. To find correlation between scores of knowledge, attitude and practice, the Pearson coefficient was determined. Total scores obtained were categorized into 3 levels: low, moderate and high. SPSS software (version 20) was used and alpha was set at the 5% level.

## 3. Results

One hundred and forty-five out of 170 final-year medical students responded to the distributed questionnaires (85.29%). Students mean age was  $24.74 \pm 1.73$  (range, 22–40 years), from whom 93 (65.5%) were female and 49 (34.5%) were male. Knowledge score of the students was  $16.13 \pm 2.06$ . Knowledge level of the subjects was moderate to high in the majority of students. Attitude score of students’ was  $36.08 \pm 3.76$ , attitude level of the students was moderate to high in the majority of students. Practice score of the study subjects

was  $22.77 \pm 4.95$ , practice level of the students was poor in [17(11.9%)] (Table 1).

Mean knowledge scores in women ( $16.45 \pm 1.87$ ) were significantly higher ( $15.67 \pm 2.30$ ) than men ( $P = 0.032$ ). Their practice score was higher than men ( $23.56 \pm 4.61$ ) as well, but it was not statistically significant ( $P = 0.291$ ) (Table 2).

Table 3 shows correct answers to knowledge questions about TB among final-year medical students. Knowledge of them was good, approximately all of them knew that TB cannot be treated based on radiography alone, but two-thirds of them did not know the distance that should be kept from contagious patients, 43% did not know what is the most important and accessible method for the diagnosis of pulmonary TB, and less than half of them knew that BCG vaccination prevents tuberculosis.

Table 4 shows the attitude of final-year medical students about TB; 15% of students reported that they did not wash their hands before and after patient contact and did not wear a face mask. About half of the students believed that the BCG vaccination plays no role in the prevention of TB. Forty percent of them did not believe that an anti-tuberculosis treatment regimen in patients with and without HIV infection is the same.

Practice score of students was ( $23.27 \pm 4.71$ ). One fourth of students practiced hand washing before and after patient contact, which shows a discrepancy between practice and attitude regarding hand washing.

Students' practice of wearing a face mask was good (70.2%), and it was associated with their belief. Half of them reported that they keep themselves distant from contagious patients correctly.

Sixty percent of students reported that they use a surgical mask when they had contact with a contagious TB patient.

#### 4. Discussion

General knowledge of the cause of TB, the contagious nature of the disease, symptoms, treatment regimens and attitude regarding TB among the final-year medical students was high. In a teaching hospital in Japan, between 1999 and 2001, fewer than 50% of participants, including physicians, answered basic questions about TB correctly [10]. In this study, students received TB education primarily from lectures and then by discussion when they encountered TB patients in the outpatient clinic and at the infectious disease ward in the teaching hospital. It seems that the combination of lectures

**Table 1** Distribution of level of knowledge, practice and attitude.

	Low	Moderate	High	Total
Knowledge <sup>a</sup>	1(0.7%)	50(34.5%)	94(64.8%)	145
Attitude <sup>b</sup>	2(1.4%)	76(53.15%)	65(45.45%)	143
Practice <sup>c</sup>	17(11.9%)	62(43.35%)	64(44.75%)	143

<sup>a</sup> Maximum possible score = 21 (low < 10, moderate 10–15, high > 15).

<sup>b</sup> Maximum possible score = 45 (low 18–27, moderate 27–35, high > 35).

<sup>c</sup> Maximum possible score = 30 (low < 20, moderate 20–25, high > 25).

**Table 2** Mean ( $\pm$ standard deviation) knowledge, attitude, and practice score for tuberculosis among last year medical students according to sex.

Sex	N (%)	Mean $\pm$ SD	Total	P value
<i>Knowledge</i>				
Male	49(34.5)	$15.67 \pm 2.30$	$16.13 \pm 2.06$	0.032
Female	93(65.5)	$16.45 \pm 1.87$		
<i>Attitude</i>				
Male	48(34)	$36.08 \pm 3.76$	$35.72 \pm 4.69$	0.97
Female	93(66)	$35.58 \pm 5.13$		
<i>Practice</i>				
Male	49(34.7)	$22.77 \pm 4.95$	$23.27 \pm 4.71$	0.291
Female	92(65.3)	$23.56 \pm 4.61$		
Total	142			

**Table 3** Distribution of correct answers to knowledge questions about tuberculosis among last year medical students.

Question	No (%)
1-What is the etiology of tuberculosis?	130(92.9)
2-Which of the following symptoms are due to tuberculosis?	141(97.2)
3-Does TB affect merely the lungs?	143(98.6)
4-Does every person infected with <i>M. Tuberculosis</i> become symptomatic?	140(97.2)
5-Are HIV-positive patients more susceptible to TB than HIV-negative individuals?	123(86)
6-Tuberculosis organisms are most commonly transmitted from person-to-person in which one of the following ways?	141(97.9)
7-Which one of the following groups has the highest risk of taking TB?	139(95.9)
8-How distant should one be kept far from contagious TB patient?	52(37.10)
9-Does BCG vaccination prevent tuberculosis?	70(48.3)
10-What is the most important and accessible method for diagnosis of pulmonary tuberculosis?	82(56.9)
11-What is the most sensitive method for the diagnosis of pulmonary tuberculosis?	101(70.1)
12-How long is required for <i>M. tuberculosis</i> to grow from sputum?	70(50)
13-Is chest radiography unique in pulmonary tuberculosis?	74(51.4)
14-Does negative PPD test rule out diagnosis of TB?	131(92.3)
15-Is tuberculosis curable?	141(97.2)
16-Does every tuberculosis patient need to be hospitalized?	134(93.1)
17-Can you treat TB patients based on radiologic findings?	136(95.8)
18-What is the duration of standard treatment in a new case of pulmonary tuberculosis patient?	137(95.1)
19-What is the duration of standard treatment in a relapse case of pulmonary tuberculosis patient?	87(63)
20-Is anti-tuberculosis treatment regimen in patients with HIV same as patients without HIV infection?	72(50.3)
21-Which drug is used to prevent tuberculosis in Iran?	114(81.4)

**Table 4** General attitude of last year medical students about tuberculosis.

Items	Very important/ important N (%)
1-Hands should be washed before and after patient care	122(85.3)
2-Wearing face masks are necessary for the examination of all patients	123(86)
3-Wearing face masks are necessary for the examination of tuberculosis patients	133(83)
4-Tuberculosis patients should be isolated in negative pressure room	121(84.6)
5-Tuberculosis patients need not always to be hospitalized	83(58.4)
6-TB patients cannot be treated merely based on radiologic findings	126(88.8)
7-Anti-tuberculosis treatment regimen in patients with and without HIV infection is the same	74(59.5)
8-The most important and accessible method for detecting is sputum smear acid fast staining	116(81.7)
9-BCG vaccination is the best preventive method	51(36.1)

on TB and the encounters with patients established sufficient general knowledge and attitudes about TB.

Knowledge scores in the present study are higher than scores in some other surveys done elsewhere in developing countries. A study by Elizabeth Kiefer in the San Juan de Lurigancho district of Lima, Peru, found that mean knowledge score was  $10.0 \pm 1.9$  out of a total possible score of 14 (71% correct) [11]. A survey of knowledge of TB in an urban slum in Nairobi, Kenya, found those with a diploma in medicine had scores better than those with lesser degrees [12].

In this study, 43.1% of students did not know that sputum smear is the most important and accessible method for the diagnosis of pulmonary

TB, and only 30% of them knew that culture of the sputum is the most sensitive method. There was a lack of knowledge about microbiologic diagnosis in these students. The study revealed that 93.1% of students knew that diagnosis cannot be based on chest X-ray alone and also 81.7% of them believed that the most important and accessible method for diagnosis of TB is the sputum smear. In a study in India, 78.5% of general practitioners recommended chest X-ray with or without other investigations for the diagnosis of TB, while only 12% recommended sputum examination [4]. Hong et al. surveyed private general practitioners in Korea and found that considerable misunderstandings existed about basic TB concepts; sputum examinations were considerably neglected [5]. In this

study, general knowledge and practice of students were good, but their practice regarding treatment was not evaluated because they did not treat patients independently and they did not request examination without supervision. The majority of them (95.1%) were familiar with the six months' duration of standard treatment.

In the field of BCG vaccination, misunderstandings were found because more than half of the students were not familiar with the effect of the BCG vaccination in the prevention of TB, and they disagree with the role it plays in the prevention of TB. In a study in Hunan, China, only 25.5% of final-year medical students knew about the effect of the BCG vaccination [13].

Frequency of wearing face masks by students were high (70.2%) in this study. In a study in Rio de Janeiro, Brazil, two-thirds of their students did not use masks when examining a pulmonary TB patient [14].

The questionnaire in this study encompassed all domains of TB, so it evaluated students better than previous studies with limited questions.

In the present study, the most worrisome finding was the lack of knowledge about TB transmission, as two-thirds of students did not know the distance that should be kept from contagious patients in spite of their recognition that the usual route of TB transmission is aerosol [5].

The limitation of this study was the self-reporting nature of assessment of practice among students. So, it must be assumed that the level of practice is even lower than reported by them.

## Conclusions

More effort should be made to improve the knowledge of students regarding TB transmission and the role of sputum smear in diagnosis, as well as emphasis on the importance of the BCG vaccination.

## Conflict of interest

There was no conflict of interest to be declared.

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