MEDICAL SCIENCE MONITOR

SPECIAL REPORTS

e-ISSN 1643-3750
© Med Sci Monit, 2013; 19: 865-874
DOI: 10.12659/MSM.889515

Received: 2013.07.02
Accepted: 2013.07.25
Published: 2013.10.18

Knowledge, experiences, and attitudes of medical students in Rome about tuberculosis

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ADE 1 Patrizia Laurenti
CDE 2 Bruno Federico
BEF 1 Matteo Raponi
BEF 1 Giuseppe Furia
ADE 1 Walter Ricciardi
ADE 1 Gianfranco Damiani

1 Institute of Hygiene and Public Health, Catholic University of Sacred Heart, Rome, Italy
2 Department of Human Sciences, Society and Health, University of Cassino and Southern Lazio, Cassino, Italy

Corresponding Author: Matteo Raponi, e-mail: matteoraponi85@gmail.com
Source of support: Self financing

Background: Tuberculosis is the second leading cause of death from infectious disease. Insufficient knowledge among doctors about tuberculosis is one of the reasons for the increased tuberculosis rates in several low-endemic countries. The purpose of this study was to assess knowledge, experience, and attitude about tuberculosis among medical students.

Material/Methods: After a pilot study, a cross-sectional survey was performed on fifth-year medical students at the Catholic University of Rome (Italy), using a self-administered questionnaire on attitude, experience and knowledge about epidemiology, diagnosis, and treatment of tuberculosis. The t test and multivariable linear regression analysis were performed to estimate the association between TB knowledge and investigated variables.

Results: Among 220 fifth-year medical students, the response rate was 83.1%. The mean percentage of correct answers was 56.6% (63.5% for epidemiology and prevention, 54.1% for diagnosis, and 45.7% for treatment). Associations between internships in wards and greater knowledge of tuberculosis diagnosis (55.9% *vs.* 51.6%, p=0.02), treatment (48.4% *vs.* 41.8%, p=0.03) and total score (58.1% *vs.* 54.5%, p=0.04) were found.
Students who reported receiving the Mantoux test had higher knowledge of tuberculosis epidemiology and prevention (65.4% *vs.* 53.3%, p=0.001), diagnosis (55.2% *vs.* 48.3%, p=0.005), and total score (58.0% *vs.* 49.1%, p=0.001). Students who had observed at least 1 active pulmonary tuberculosis case had a higher percentage of correct answers about diagnosis (55.5% *vs.* 51.4%, p=0.03) and total score (57.9% *vs.* 54.0%, p=0.03).
The multivariable linear regression confirmed the association between higher knowledge and receiving the Mantoux test (β coefficient=7.2; 95% CI 2.6–11.7), as well as having observed at least 1 X-ray of a TB patient (β coefficient=5.3; 95% CI 1.0–9.7).

Conclusions: A moderate level of general knowledge about tuberculosis was found, which suggests the need to modify current programs of infectious diseases in the curriculum of medical schools.

Key words: attitudes • clinical experience • knowledge • medical education • tuberculosis

Full-text PDF: http://www.medscimonit.com/download/index/idArt/889515

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

Background

Tuberculosis (TB) is one of the most common communicable diseases world and continues to be a major global health problem. It causes disease among millions of people each year, and, after HIV, it ranks as the second leading cause of death from an infectious disease worldwide [1]. In the last 30 years, migration and emigration, negligence of TB control programs, and above all, the emergence of the HIV/AIDS epidemic, have produced an increase of TB rates in several countries [2,3].

Although the principles of TB management are well defined, this infectious disease is often not properly diagnosed and treated. Insufficient knowledge among doctors about TB is one of the reasons for this failure. Despite the abundance of information on all content areas of TB, clinicians still make frequent errors in TB treatment [4].

In this context, there is the need for accurate undergraduate training in TB and of a comprehensive educational strategy is essential to provide medical students with the appropriate knowledge, skills, and attitudes necessary for the effective management of TB to promote effective prevention, early diagnosis, and successful treatment.

In the USA, the National Institutes of Health funded the National Tuberculosis Curriculum Consortium (NTCC) to meet this need. The goal of the NTCC is to improve skills and instill appropriate attitudes in the management and control of TB among medical students in their formative years, and to establish a foundation by which complex issues relating to TB can be continually revisited throughout the span of their careers [5]. Several studies have investigated the knowledge and attitudes of medical students about TB. Emili et al. [6] compared knowledge and practices regarding TB among final-year medical students at schools in endemic and non-endemic areas (Canada, India, and Uganda), revealing significant differences in undergraduate knowledge and practice competency in regards to TB at 3 medical schools.

Kilicaslan et al. [7] conducted a study at the Istanbul Medical School to assess whether TB-related questions asked during chest medicine examinations complied with the World Health Organization's (WHO) learning objectives for TB training and to investigate students' skills in interpreting TB radiology and smears. The study showed that the examination questions did not adequately reflect WHO learning objectives, and that the students' skills suggested that their practical training on TB was insufficient. Jackson et al. [8] performed a self-administered survey among students in NTCC schools to establish a baseline level of knowledge, attitudes, and confidence about TB, and they concluded that there was room for improvement in these 3 areas. In Brazil, Teixeira et al. [9] performed a cross-sectional survey of undergraduate medical students in preclinical, early clinical and late clinical years about previous lectures on TB, knowledge about TB transmission, exposure to patients with active pulmonary TB, and the use of protective respiratory masks. They concluded that many medical students were not aware of the main routes of TB infection and that lectures on TB were not sufficient to change knowledge and practices. Regardless of knowledge about TB transmission, students engaged in risky behaviors: more than two-thirds did not use a protective mask when examining an active TB case.

Little is known about the effectiveness of training programs for the treatment of TB in Europe. With this background, we performed a survey to assess knowledge, attitudes, and competencies about TB among fifth-year medical students at the School of Medicine of the Catholic University in Rome, Italy.

The aim of this study was 2-fold: 1) to determine knowledge, experiences, and attitudes of medical students regarding TB in a University Teaching Hospital and 2) to establish which individual factors are associated with a greater knowledge about TB.

Material and Methods

Study design

A cross-sectional survey was conducted at the School of Medicine of the Catholic University in Rome among fifth-year medical students. This group of students was selected because the course on infectious diseases takes place in the fourth year.

The survey was carried out with a self-administered questionnaire designed on the basis of NTCC contents. The questionnaire consisted of 39 multiple-choice questions divided by area: attitudes and experiences (7 questions), knowledge about epidemiology and prevention (13 questions), diagnosis (14 questions), and treatment (5 questions). Each question about knowledge had 5 possible answers, of which only 1 was correct. To test the questionnaire, a pilot study was conducted from April to June 2012 among second- and third-year midwifery students and first-, second-, and third-year medical residents in hygiene, occupational medicine, and forensic medicine. Thirty-seven students and residents were enrolled in this pilot phase and all completed the questionnaire. The pilot study allowed us to modify the wording of some questions.

The survey was conducted from July to October 2012 on fifth-year medical students. To increase the number of respondents, students were enrolled before being examined in Public Health. Students were introduced to the aims, objectives, and the methodology of the study, and they were invited to participate on a voluntary basis. After obtaining informed verbal consent, the

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

students were asked to complete the questionnaire anonymously. They were given a maximum of 30 minutes to complete it.

Statistical analyses

An overall score was computed for all questions related to knowledge (total score). Separate scores were calculated for questions related to epidemiology and prevention, diagnosis, and treatment.

Mean percentage scores were computed for different subgroups on the basis of demographic variables, experiences, and attitudes.

Differences between these subgroups in mean percentage scores were tested using the t test.

Multivariable linear regression analysis was performed to estimate the effect on TB knowledge of each variable, adjusting for the effect of the other variables in the model. Multivariable regression models were built for epidemiology and prevention, diagnosis, and treatment, respectively.

Results of these models are shown using β coefficients with 95% confidence intervals (95% CI), which describe the expected change in the percentage of correct answers associated with each variable.

Results

Among 220 fifth-year medical students enrolled in the University, 186 students were present at the time of data collection. Of these, 183 (83.1% of fifth-year students) completed the questionnaire.

Table 1 shows the characteristics of the sample. The mean age was 24 years (SD 0.12, range 22–30). About half were female (52%, n=95), and more than half (58.5%, n=107) reported attending a clinical unit.

Most of the sample (84.2%, n=154) reported receiving the Mantoux test. About one-fifth (21.9%, n=40) had performed at least 1 Mantoux test. Two-thirds of the students (66.1%, n=121) observed at least 1 TB case during their medical education and 83.1% (n=152) had observed at least 1 TB patient X-ray. Only two-thirds (66.7%, n=122) were aware of being at risk for TB infection.

Knowledge

Among the 32 multiple-choice questions designed to evaluate student knowledge of TB, the mean percentage of correct answers was 56.6% (SD 11.6%).

Table 1. Characteristics of the sample.

	N	%
Demographic		
Gender		
Male	88	48
Female	95	52
Age Mean (Std. Dev.)	24 (0.12)	
Internship		
Yes	107	58.5
No	76	41.5
Experiences and attitudes		
I received Mantoux test		
Yes	154	84.2
No, I don't know	29	15.8
I performed at least one Mantoux test		
Yes	40	21.9
No, I don't know	143	78.1
I observed at least one TB case		
Yes	121	66.1
No, I don't know	62	33.9
I observed at least one x-ray of TB patient		
Yes	152	83.1
No, I don't know	31	16.9
I think I am at risk for TB		
Yes	122	66.7
No, I don't know	61	33.3

The mean percentage of correct answers was 63.5% (SD 16.3%) for epidemiology and prevention, 54.1% (SD 12.4%) for diagnosis, and 45.7% (SD 20.4%) for treatment. Figure 1 shows the distribution of the mean percentage of correct answers by area of knowledge.

In the "Epidemiology and Prevention" area (Figure 2), the highest and the lowest mean scores were reported for the following questions, respectively: "*the etiologic agent of TB is transmitted by ____" (98.9% correct answers); and "currently the prevalence of TB is highest in the following areas of the world: ____" (8.2% correct answers).*

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

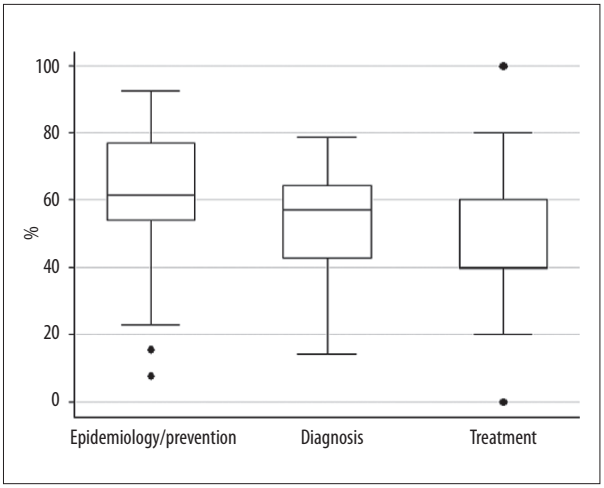

Figure 1. Distribution of correct answers.

In the "Diagnosis" area (Figure 3), the questions with the highest and the lowest mean scores, respectively, were: "*which organ could be affected by M. tuberculosis" (95.6%);* and *"The tine test is ____" (10.4%).*

In the "Treatment" area (Figure 4), the questions with the highest and the lowest mean scores, respectively, were: "*which of these antibiotics are not useful for TB treatment: ____" (82.0%);* and *"prophylactic treatment with isoniazid is implemented to ____" (13.1%).*

Factors associated with knowledge

Table 2 shows that younger students (age <24) had on average greater TB knowledge (58.1% of correct answers *vs.* 54.7%, p=0.05), whereas no association was found between gender and the mean percentage of correct answers. There was a significant association between internship in units and departments and greater knowledge about TB diagnosis (55.9% *vs.* 51.6%, p=0.02), treatment (48.4% *vs.* 41.8%, p=0.03), and total score (58.1% *vs.* 54.5%, p=0.04).

Students who reported receiving the Mantoux test had greater knowledge about TB epidemiology and prevention (65.4% *vs.* 53.3%, p=0.001), diagnosis (55.2% *vs.* 48.3%, p=0.005), and total score (58.0% *vs.* 49.1%, p=0.001).

Students who reported observing at least 1 active pulmonary TB case had a higher percentage of correct answers about diagnosis (55.5% *vs.* 51.4%, p=0.03) and total score (57.9% *vs.* 54.0%, p=0.03).

Students who reported observing at least 1 X-ray of a TB patient had a higher percentage of correct answers about epidemiology and prevention (64.7% *vs.* 57.3%, p=0.02), diagnosis (55.1% *vs.* 49.5%, p=0.02), and total score (57.7% *vs.* 51.2%, p=0.004). Students who considered themselves to be

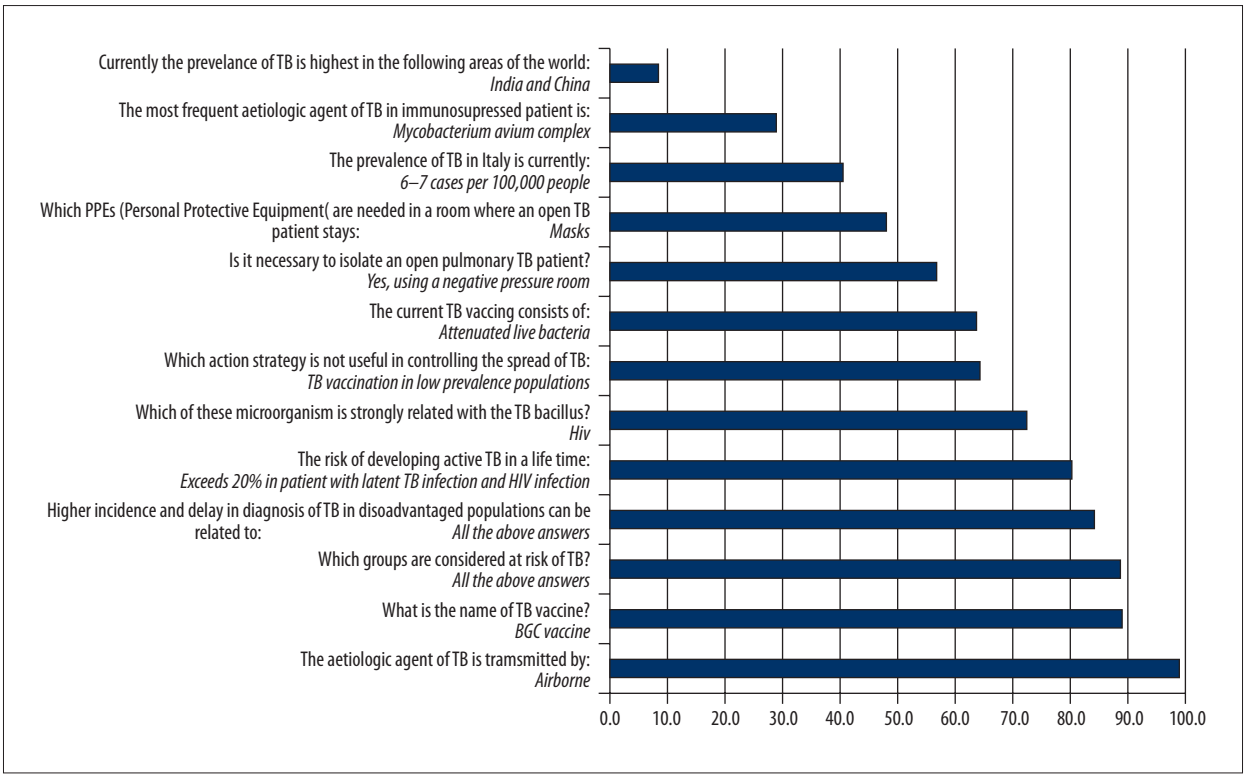

Figure 2. Mean percentage of correct answers in epidemiology and prevention area.

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

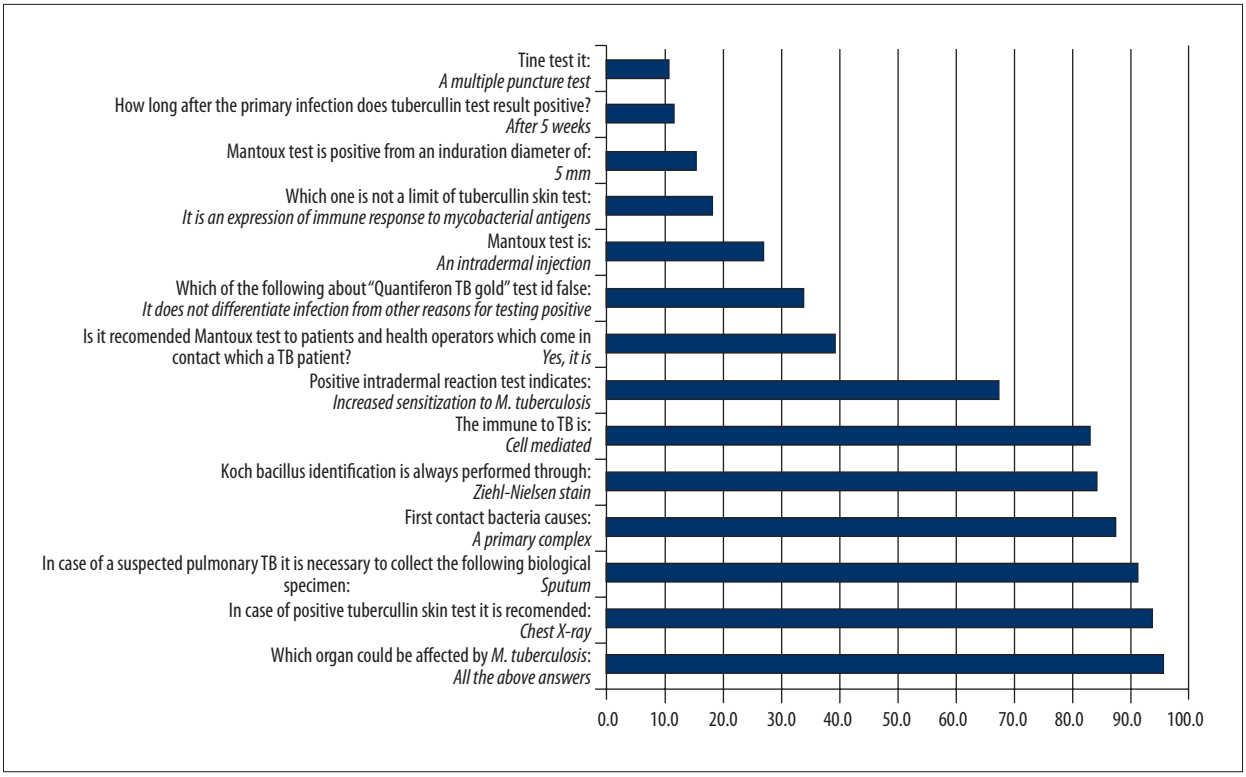

Figure 3. Mean percentage of correct answers in diagnosis area.

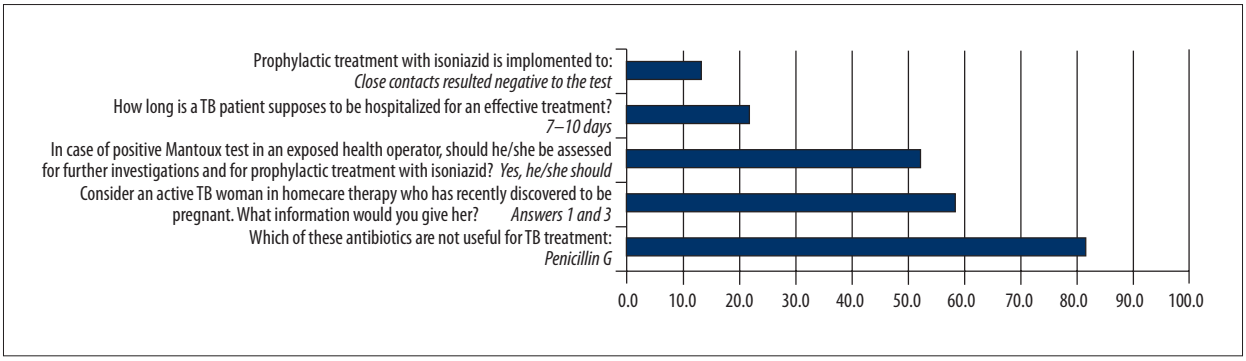

Figure 4. Mean percentage of correct answers in treatment area.

at risk for TB reported a similar percentage of correct answers as other students.

The multivariable linear regression analysis (Table 3) confirmed the association between receiving the Mantoux test and greater knowledge about TB epidemiology and prevention (β coefficient=10.8; 95% CI 4.2–17.3), diagnosis (β coefficient=5.0; 95% CI 0.1–10.0), and total score (β coefficient=7.2; 95% CI 2.6–11.7). In addition, having observed at least 1 X-ray of a TB patient was associated with a higher total score (β coefficient=5.3; 95% CI 1.0–9.7). The analysis did not reveal any association between greater knowledge and gender, age, and feeling at risk.

Discussion

This study showed that more than half of the questions about knowledge of TB treatment were wrong. This is in line with other surveys carried out among medical students [7–9]. One-sixth of the students did not remember receiving the Mantoux test, which was compulsory for the investigated medical students. Furthermore, medical students who remembered receiving the Mantoux test demonstrated a better grasp of knowledge about TB.

Specifically, we found an association between memory receiving the Mantoux test and greater knowledge of epidemiology and prevention, diagnosis, and the total score, which strengthens the role of the memory effect.

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

Table 2. Mean percentage of correct answers by characteristics of the sample.

	Total		Epidemiology and prevention		Diagnosis		Treatment	
	Mean score	p-value	Mean score	p-value	Mean score	p-value	Mean score	p-value
Gender								
M	56.5	*0.934*	62.9	*0.669*	55.0	*0.348*	44.1	*0.311*
F	56.7		64.0		53.3		47.2	
Age								
<24	58.1	*0.053*	65.3	*0.079*	55.2	*0.175*	47.1	*0.277*
≥24	54.7		61.1		52.7		43.8	
Internship								
Yes	58.1	*0.036*	64.2	*0.475*	55.9	*0.019*	48.4	*0.031*
No	54.5		62.4		51.6		41.8	
I received Mantoux test								
Yes	58.0	*0.001*	65.4	*0.001*	55.2	*0.005*	46.6	*0.151*
No, I don't know	49.1		53.3		48.3		40.7	
I performed at least one Mantoux test								
Yes	55.9	*0.680*	60.6	*0.203*	55.0	*0.619*	46.5	*0.775*
No, I don't know	56.8		64.3		53.9		45.5	
I observed at least one TB case								
Yes	57.9	*0.031*	64.8	*0.111*	55.5	*0.031*	46.6	*0.391*
No, I don't know	54.0		60.8		51.4		43.9	
I observed at least one x-ray of TB patient								
Yes	57.7	*0.004*	64.7	*0.020*	55.1	*0.023*	46.8	*0.089*
No, I don't know	51.2		57.3		49.5		40.0	
I think I am at risk for TB								
Yes	57.6	*0.109*	64.7	*0.152*	54.6	*0.452*	47.4	*0.112*
No, I don't know	54.7		61.0		53.2		42.3	

The relationship between recall of preventive medicine activities and greater knowledge about TB is consistent with previous studies that reported an association between HPV and influenza vaccination and a greater knowledge of those diseases [10–12].

We also found evidence of a significant association between greater clinical experience, indicated by those who had seen cases and a chest X-ray of a TB patient and/or those who had attended an internship in clinical wards and had greater knowledge of TB diagnosis and treatment. This may be related to the time devoted to personal insights about TB and the number of patients with TB seen by medical students [6].

In recent years, the role of Problem-Based Learning in medical education was highlighted by empirical studies that found strong evidence that this method had positive effects on student knowledge, stressing the benefits of Problem-Based Learning integrated within a traditional curriculum [13,14].

Appropriate practice and attitudes in the treatment of TB are among the main goals that can be achieved through the adoption of competency-based programs that are responsive to rapidly changing needs, as well as promoting a new instrument of learning that includes the capacity to integrate knowledge and good practices [15]. Studies like ours, which are designed to evaluate the training of medical students and to identify inadequacies in their education, are needed to implement changes because failure to address these issues can affect both patient and public health.

According to the WHO, medical professionals should know about national and international expansion of the TB burden, national TB prevention policies such as control strategies, and the BCG vaccination recommendations [16]. Knowledge of these

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

Table 3. Results of the multivariable linear regression of the percentage of correct answers.

	Total		Epidemiology and prevention		Diagnosis		Treatment	
	β coef.	95% CI	β coef.	95% CI	β coef.	95% CI	β coef.	95% CI
Gender								
F	–0.1	*(–3.3; 3.1)*	1.0	*(–3.6; 5.6)*	–2.1	*(–5.6; 1.4)*	2.6	*(–3.3; 8.5)*
Age								
≥24	–1.5	*(–4.8; 1.8)*	–2.4	*(–7.1; 2.4)*	–0.9	*(–4.5; 2.7)*	–0.9	*(–7.0; 5.2)*
Internship								
Yes	2.8	*(–0.5; 6.1)*	0.9	*(–3.9; 5.7)*	3.5	*(–0.1; 7.1)*	5.8	*(–0.4; 11.9)*
I received Mantoux test								
Yes	7.2	*(2.6; 11.7)*	10.8	*(4.2; 17.3)*	5.0	*(0.1; 10.0)*	3.8	*(–4.6; 12.1)*
I performed at least one Mantoux test								
Yes	2.0	*(–1.3; 5.3)*	0.0	*(–4.8; 4.8)*	3.2	*(–0.4; 6.8)*	3.7	*(–2.4; 9.8)*
I observed at least one TB case								
Yes	1.8	*(–1.7; 5.3)*	2.0	*(–3.0; 7.0)*	2.4	*(–1.4; 6.2)*	–0.3	*(–6.7; 6.2)*
I observed at least one x-ray of TB patient								
Yes	5.3	*(1.0; 9.7)*	5.9	*(–0.4; 12.1)*	4.4	*(–0.3; 9.2)*	6.5	*(–1.5; 14.5)*
I think I am at risk for TB								
Yes	2.4	*(–1.1; 5.8)*	2.5	*(–2.4; 7.5)*	1.3	*(–2.5; 5.0)*	5.1	*(–1.2; 11.5)*
Intercept	41.5	*(34.8; 48.1)*	46.5	*(36.9; 56.1)*	41.6	*(34.4; 48.9)*	27.8	*(15.4; 40.1)*

topics was investigated in the present study and a poor level of knowledge was reported. In recent years, the Centers for Disease Control and Prevention and NTCC have proposed curricula offering the basics of training undergraduate students and doctors about the fundamentals of TB prevention, diagnosis, and treatment [5,17]. Our survey results highlight the need to develop educational tools using active learning strategies to improve knowledge and ensure social accountability of medical schools.

This study has some limitations as well as some strengths. The questionnaire was administered prior to the public health course examination; consequently, some medical students might have answered haphazardly because they were more concerned about the upcoming examination. However, this timing of data collection allowed us to obtain a very large sample and high compliance. On the other hand, the preparation for the public health exam may have increased the students' general level of knowledge about TB.

We investigated not only comprehensive knowledge, but also experience and attitudes about TB among students and related these to knowledge. The cross-sectional design of this survey does not allow the evaluation of causal relationships, but it does make associations between several factors that represent, in any case, the basis for testing causal hypothesis in further studies.

Our survey represents a good starting point for future longitudinal studies aimed at assessing the impact of changes in curricula on student knowledge.

Conclusions

Our findings show a moderate knowledge about TB among fifth-year medical students. Internship was found to be strongly associated with a greater knowledge of TB diagnosis, epidemiology, and prevention.

We provide a clear snapshot of the differences in TB learning between the more sensitized and experienced students who apply what they have learned, and others who are more dedicated to theoretical learning.

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

Appendix

Questionnaire

General information

Gender:
1. Male
2. Female
Age: ___
If you are a student of medicine, in which department you are?
1. _____
2. None

Experiences and attitudes

1) Have you ever attended courses in which TB was discussed?
1. Yes
2. No, I don't know
2) I received Mantoux test:
1. Yes
2. No, I don't know
3) If yes, test was:
1. Positive
2. Negative
3. I don't know
4) I performed at least one Mantoux test:
1. Yes
2. No, I don't know
5) I observed at least one TB case:
1. Yes
2. No, I don't know
6) I observed at least one x-ray of TB patient:
1. Yes
2. No, I don't know
7) I think I am at risk for TB:
1. Yes
2. No, I don't know

Knowledge

Just one answer is correct

Epidemiology and prevention

1) Currently the prevalence of TB is highest in the following areas of the world:
1. India and China
2. Africa
3. Central and South America
4. Eastern Europe
5. I don't know
2) Which of these microorganisms is strongly related with the TB bacillus?
1. HTLV
2. CMV
3. HIV
4. EBV
5. I don't know
3) The current TB vaccine consists of:
1. Killed bacteria
2. Live and attenuated bacteria
3. It is a recombinant/purified protein vaccine
4. It doesn't exist
5. I don't know
4) What is the name of TB vaccine?
1. Salk
2. MPR
3. **BCG**
4. It doesn't exist
5. I don't know
5) Is it necessary to isolate an open pulmonary TB patient?
1. Yes, using a positive pressure room
2. Yes, using a negative pressure room
3. yes, only if the patient coughs
4. No
5. I don't know
6) The prevalence of TB in Italy is currently:
1. 0.6–0.7 cases per 100,000 people
2. 6–7 cases per 100,000 people
3. 60–70 cases per 100,000 people
4. 600–700 cases per 100,000 people
5. I don't know
7) The risk of developing active TB in a lifetime:
1. Exceeds 20% in patients with latent TB infection and Hiv infection
2. Is not related to TB latent infection
3. Is not related to Hiv infection
4. Is not related to the exposure and the recent acquisition of infection
5. I don't know
8) Which action strategy is not useful in controlling the spread of TB?
1. TB vaccination in high prevalence populations
2. Identification, isolation and treatment of active disease cases
3. Diagnosis and treatment of latent TB infection
4. TB vaccination in low prevalence populations
5. I don't know
9) Which groups are considered at risk of TB?
1. Health operators
2. Immigrants from high prevalence countries
3. Elderly, children, immunosuppressed patients
4. All the above answers
5. I don't know

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

10) The most frequent aetiologic agent of TB in immunosuppressed patients is:
1. *Mycobacterium tuberculosis*
2. *Mycobacterium Avium* Complex
3. *Mycobacterium Bovis*
4. *Mycobacterium Xenopi*
5. I don't know
11) The aetiologic agent of TB is transmitted by:
1. Airborne
2. Bloodborne
3. Direct contact
4. Mother to child
5. I don't know
12) Higher incidence and delay in diagnosis of TB in disadvantaged populations can be related to:
1. Disequalities
2. Socio-economic issues
3. Low resources of native country
4. All the above answers
5. I don't know
13) Which PPEs (Personal Protective Equipment) are needed in a room where an open TB patient stays:
1. Masks
2. Protective coats
3. Glasses
4. All the above answers
5. I don't know

Diagnosis

14) The immune response to TB is:
1. Semi delayed
2. Caused by circulating immune complexes
3. Immediate
4. Cell mediated
5. I don't know
15) Tine test is:
1. A multiple puncture test
2. An intradermal injection
3. An intramuscular injection
4. A serological test
5. I don't know
16) Mantoux test is:
1. An intradermal injection
2. An intradermal response
3. A vaccination
4. A serological test
5. I don't know
17) Which one is not a limit of tuberculin skin test:
1. It is a test *in vivo* that requires a return visit
2. It is an operator-dependent test
3. It shows a number of false positive results due to cross-reactivity with other antigenic components
4. It is an expression of immune response to mycobacterial antigens
5. I don't know
18) Which of the following about "Quantiferon TB gold" test is false:
1. It is a test performed *in vitro* on a sample of peripheral venous blood
2. It measures the production of IFN α by antigen-specific for MTB lymphocytes T using an Elisa methodology
3. In 2001 this test has been approved by the FDA as a support in the diagnosis of latent tuberculosis infection
4. It does not differentiate infection from other reasons for testing positive
5. I don't know
19) Mantoux test is positive from an induration diameter of:
1. 5 mm
2. 7 mm
3. 10 mm
4. 15 mm
5. I don't know
20) Positive intradermal reaction test indicates:
1. Diagnosis of TB infection
2. Increased sensitization to *M. tuberculosis*
3. Increased sensitization to drugs
4. Ongoing disease
5. I don't know
21) In case of a suspected pulmonary TB it is necessary to collect the following biological specimen:
1. Sputum
2. Saliva
3. Bronchoscopic biopsy
4. Intradermal material
5. I don't know
22) First contact with bacteria causes:
1. A primary complex
2. Overt disease
3. Miliary Tuberculosis
4. Change of the antibody titer
5. I don't know
23) In case of positive tuberculin skin test it is recommended:
1. ECG
2. Spirometry
3. Chest x-ray
4. Lung biopsy
5. I don't know
24) Which organ could be affected by *M. Tuberculosis*?
1. Lung
2. Brain
3. Kidney
4. All the above answers
5. I don't know
25) Koch bacillus identification is always performed through:
1. PAS stain

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]

2. Methylene blue stain
3. Hematoxylin and eosin stain
4. Ziehl–Neelsen stain
5. I don't know

26) Is it recommended Mantoux test to patients and health operators which come in contact with a TB patient?
1. Yes, it is
2. No, it isn't
3. No, they should be immediately vaccinated
4. Yes, if they are not vaccinated
5. I don't know

27) How long after the primary infection does tuberculin test result positive?
1. After one week
2. After 10 days
3. After 5 weeks
4. After 10 weeks
5. I don't know

Treatment

28) Which of these antibiotics are not useful for TB treatment?
1. Ethambutol
2. Isoniazid
3. Rifabutin
4. Penicillin G
5. I don't know

29) Consider an active TB woman in homecare therapy who has recently discovered to be pregnant. What information would you give her?
1. Tuberculosis does not increase the risk of miscarriage
2. You reassure her because there's not risk for the child
3. You recommend her to change treatment because there is a potential risk of toxicity for the child
4. Answers 1 and 3
5. I don't know

30) How long is a TB patient supposed to be hospitalized for an effective treatment?
1. 2–3 days
2. 7–10 days
3. 20–30 days
4. 30–40 days
5. I don't know

31) Prophylactic treatment with isoniazid is implemented to:
1. All health care workers of the ward
2. All contacts
3. Close contacts resulted negative to the test
4. Unvaccinated contacts
5. I don't know

32) In case of positive Mantoux test in an exposed health operator, should he/she be assessed for further investigations and for prophylactic treatment with isoniazid?
1. Yes, he/she should
2. No, he/she should not
3. It's not necessary, he/she should be immediately vaccinated
4. Yes, only if he/she has specific symptoms
5. I don't know

References:

1. World Health Organization 2012. WHO Global tuberculosis report 2012. Available from: URL: *http://www.who.int/tb/publications/global_report/en/*
2. Davies PD: The world-wide increase in tuberculosis: how demographic changes, HIV infection and increasing numbers in poverty are increasing tuberculosis. Ann Med, 2003; 35(4): 235–43
3. Kilicaslan Z: Tuberculosis in World and Turkey. ANKEM Dergisi, 2007; 21 (Ek 2): 76–80
4. Rao SN, Mookerjee AL, Obasanjo OO, Chaisson RE: Errors in treatment of tuberculosis in Baltimore. Chest, 2000, 117: 734–37
5. Harrity S, Jackson M, Hoffman H, Catanzaro A: The National Tuberculosis Curriculum Consortium: a model of multi-disciplinary educational collaboration. Int J Tuberc Lung Dis, 2007; 11: 270–74
6. Emili J, Norman GR, Upshur REG et al: Knowledge and practices regarding tuberculosis: a survey of final-year medical students from Canada, India and Uganda. Med Educ, 2001; 35: 530–36
7. Kilicaslan Z, Kiyan E, Erkan F et al: Evaluation of undergraduate training on tuberculosis at Istanbul Medical School. Int J Tuberc Lung Dis, 2003; 7(2): 159–64
8. Jackson M, Harrity S, Hoffman H, Catanzaro A: A survey of health professions students for knowledge, attitudes, and confidence about tuberculosis, 2005. BMC Public Health, 2007; 7: 219
9. Teixeira EG, Menzies D, Cunha AJ et al: Knowledge and practices of medical students to prevent tuberculosis transmission in Rio de Janeiro, Brazil. Rev Panam Salud Publica, 2008; 24(4): 265–70
10. Licht AS, Murphy JM, Hyland AJ et al: Is use of the human papillomavirus vaccine among female college students related to human papillomavirus knowledge and risk perception? Sex Transm Infect, 2010; 86(1): 74–78
11. Donadiki EM, Jiménez-García R, Hernandez-Barrera V et al: Knowledge of the HPV vaccine and its association with vaccine uptake among female higher-education students in Greece. Hum Vaccin Immunother, 2012; 9(2)
12. Martinello RA, Jones L, Topal JE: Correlation between healthcare workers' knowledge of influenza vaccine and vaccine receipt. Infect Control Hosp Epidemiol, 2003; 24(11): 845–47
13. Dochy F, Segers M, Bossche van den P, Gijbels D: Effects of PBL: a meta-analysis. Learning and Instruction, 2003; 13: 533–68
14. Gurpinar E, Musal B, Aksakoglu G, Ucku R: Comparison of knowledge scores of medical students in problem-based learning and traditional curriculum on public health topics. BMC Med Educ, 2005, 5(1): 7
15. Frenk J, Chen L, Bhutta ZA et al: Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. Lancet, 2010; 376(9756): 1923–58
16. Lalit MN, Jai PN: The Role of Medical Schools in Tuberculosis Control. New Delhi: World Health Organization, 2002
17. Centers for Disease Control and Prevention (CDC), Division of Tuberculosis Elimination. Core Curriculum on Tuberculosis: What the Clinician Should Know. 5th edition (2011). Available from: *URL:http: //www.cdc.gov/tb/education/corecurr/default.htm*

Indexed in: [Current Contents/Clinical Medicine] [SCI Expanded] [ISI Alerting System] [ISI Journals Master List] [Index Medicus/MEDLINE] [EMBASE/Excerpta Medica] [Chemical Abstracts/CAS] [Index Copernicus]