

# Effect of tuberculosis-related educational intervention on cognitive domain scores of undergraduate Humanities students in Thane district, Maharashtra

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## Abstract

**Objective:** This complete-enumeration before-and-after study (without controls) was conducted to determine the effect of tuberculosis-related educational intervention on the cognitive domain scores of undergraduate Humanities students in Thane district, Maharashtra.

**Methodology:** After obtaining institutional approvals and written informed consent, participating undergraduate Humanities students (n=51) were oriented about the purpose of the study and a pre-test was administered. Subsequent to an educational intervention programme on various aspects of tuberculosis, the students were given a post-test questionnaire, which was identical to that of the pre-test. The pre- and post-test scores were statistically analysed.

**Results:** The differences between the correct responses to 12 out of 16 questions in pre- and post-test were significant. The mean correct responses in the post-tests were much higher than that for the pre-test for all questions. After the educational intervention, there was an overall improvement in scores for female students over that for males. The main sources of TB-related information were television (50.98%) and the Internet (27.45%).

**Conclusion:** Male students had higher scores in the pre-test but the post-test showed an overall improvement in scores for female students over that for males. After educational intervention, there was an overall improvement in the scores obtained by both male and female students.

**Keywords:** Educational Intervention, Cognitive Domain Scores, Undergraduate teaching.

## 1. Introduction

Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, is a disease that has affected humans since pre-historic times and remains a major public health problem in India. According to the World Health Organization, India ranks among the high-burden countries for TB with an estimated 2.8 million TB-affected persons. [1]

One of the elements of the Stop-TB Strategy of the World Health Organization is to empower communities through education and communication. [2] A systematic review [3] has reported that the median delay (onset of symptoms to treatment initiation) in India was 55.3 days. Inadequate TB-related awareness and misconceptions, [4]

incomplete anti-TB therapy, [5] fear of social stigma, [6] are among the factors that impede TB control efforts. The HIV/AIDS pandemic and the association of TB with HIV/AIDS have increased the stigma surrounding TB. [7]

Inadequate TB-related knowledge begets treatment default, which may result in multi-drug resistant TB. [8] Studies from Malaysia, [9] Bangladesh, [10] Pakistan, [11] and Ethiopia, [12] have found that TB burden can be reduced by community-based awareness programmes.

College students may be envisaged as important target groups for TB-related community awareness programmes because they form a “captive” and literate

population, where remedial educational interventions can be easily implemented at a mutually convenient time and place. Simple educational interventions may have the potential to produce substantial changes in knowledge of not only the target groups but also of the family members and others in the students' social networks. A study, [13] conducted in Western India, reported that students tend to disseminate health-related information to less educated parents, who are not reached by the traditional methods of health education.

Humanities students outnumber the Health Science students. As compared to Health Science students, students of Humanities have relatively less strenuous curriculum and time constraints. If trained, these numerous Humanities students can be a valuable human resource for spreading messages on TB prevention and for advising symptomatic persons in their own communities to seek medical care. Due to the above-mentioned reasons, the study was conducted on Humanities students. For this reason, this study was conducted to determine the effect of TB-related educational intervention on the cognitive domain scores of undergraduate Humanities students.

## 2. Methodology

**2.1. Study Area:** This complete enumeration, before-and-after study (without controls) was conducted in a college conducting Humanities courses in Thane district, Maharashtra.

**2.2. Participants:** Undergraduate students aged 18 years and above, of either sex, who were enrolled for Humanities courses in a college in Thane district, Maharashtra.

**2.3. Inclusion criteria:** Undergraduate students who gave written informed consent to participate in the study.

**2.4. Exclusion criteria**

Those who did not give written informed consent to participate in the study.

## 2.5. Procedure

After obtaining approvals from the Institutional Ethics Committee (IEC), undergraduate Humanities students were oriented about the purpose of the study. After obtaining written informed consent, the students were asked to take a pre-test comprising 16 TB-related questions with a maximum obtainable score of 16 and were also asked to mention their source of TB-related information. After an educational intervention programme (PowerPoint presentation and question-answer session) on various aspects of TB, the students were given a post-test questionnaire, which was identical to that of the pre-test.

## 2.6 Statistical Methods

The obtained data were tabulated and statistically analysed using EpiInfo Version 7.0 (public domain software package from the Centers for Disease Control and Prevention, Atlanta, GA, USA). Continuous data were presented as Mean and Standard Deviation (SD) and categorical data as percentages. Confidence interval (CI) was determined using the formula: [Mean - (1.96)\*Standard Error] - [Mean+(1.96)\*Standard Error]. The standard error of difference between two means was calculated and statistical significance was determined at  $p < 0.05$ .

## 3. Results

### 4.1. Pre- and post-test scores

The differences between the correct responses in pre- and post-test were significant, except for responses to questions on organs affected by TB, role of BCG vaccine, tests for confirming presence of TB disease and hazards of incomplete and irregular treatment. (Table 1) However, the mean correct responses in the post-tests were much higher than that for the pre-test for all questions. (Figure 1)

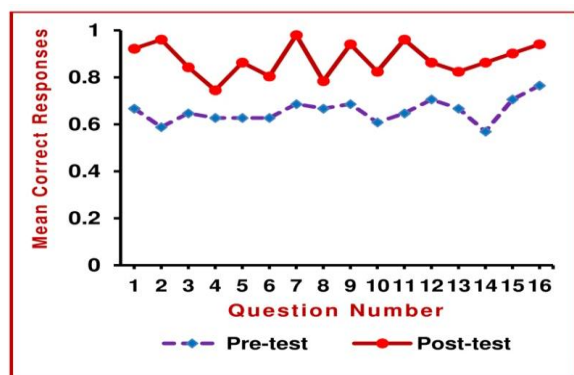
**Table 1: Analysis of correct responses in pre- and post-tests (n=51)**

No.	Topic of Question	Pre-test (%)	Post-test (%)	Chi <sup>2</sup> value #	p value	Odds Ratio
1	Transmission of TB	34 (66.67)	47 (92.16)	10.03	0.002 *	0.17
2	Curability of TB	30 (58.82)	49 (96.08)	20.06	0.00001 *	0.06
3	Govt. [versus] Private treatment	33 (64.71)	43 (83.41)	5.16	0.023 *	0.341
4	Organs affected by TB	32 (62.75)	38 (74.51)	1.63	0.2	0.57
5	Impact of tobacco smoking	32 (62.75)	44 (86.27)	7.43	0.006 *	0.267
6	Isolation of patient required or not	32 (62.75)	41 (80.39)	3.90	0.048 *	0.41
7	Asymptomatic TB	35 (68.63)	50 (98.04)	15.72	0.00007 *	0.043
8	Role of BCG vaccine	34 (66.67)	40 (78.43)	1.77	0.183	0.55
9	Duration of Anti-TB treatment	35 (68.63)	48 (94.12)	10.82	0.001 *	0.136
10	Availability of free treatment	31 (60.78)	42 (82.35)	5.83	0.015 *	0.33
11	Signs and symptoms	33 (64.71)	49 (96.08)	15.77	0.00007 *	0.07
12	Tests to confirm TB	36 (70.59)	44 (86.27)	3.71	0.054	0.38
13	Hazards of Irregular or incomplete treatment	34 (66.67)	42 (82.35)	3.30	0.069	0.43
14	Stopping transmission of TB	29 (56.86)	44 (86.27)	10.84	0.001 *	0.21
15	Sputum examination	36 (70.59)	46 (90.20)	6.16	0.013 *	0.261
16	Poverty and TB	39 (76.47)	48 (94.12)	6.27	0.012 *	0.20

TB = Tuberculosis; \* Statistically significant; # Chi square test with Mantel-Haenszel correction where applicable; Figures in parentheses indicate percentages

In the pre-test, the highest correct scores were for questions pertaining to – tests for confirming TB (Mean=0.706; SD=0.46), sputum examination (Mean=0.706; SD=0.46) and relationship between poverty and TB (Mean=0.765; SD=0.428). In the post-test, the highest correct scores were for questions pertaining to – transmission of TB (Mean=0.922; SD=0.272), its curability (Mean=0.961; SD=0.196), whether TB-infected persons can remain asymptomatic (Mean=0.980; SD=0.14), duration of anti-TB treatment (Mean=0.941; SD=0.238), signs and symptoms (Mean=0.961; SD=0.196), sputum examination (Mean=0.902; SD=0.3) and relationship between poverty and TB (Mean=0.941; SD=0.238).

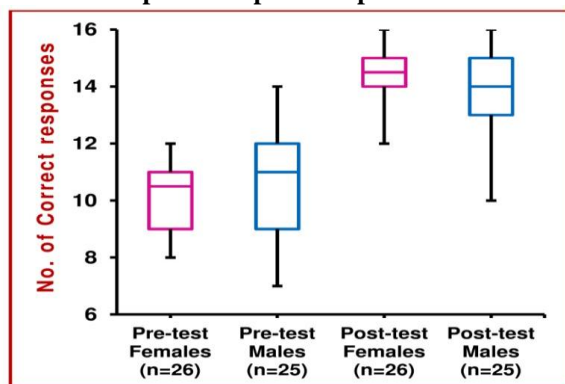
**Figure 1: Mean correct responses in pre- and post-tests**



### 3.2. Gender differences

In the pre-test, the minimum scores for male students were much lower than that for their female counterparts. However, the first quartile, median, third quartile and maximum scores were higher for males. (Figure 2) In the post-test, the maximum score and third quartile for both genders were at par. The minimum score and the first quartile for females was much higher than that for males. The first quartile for females was more than the median for males indicating that 25% of female students had higher scores than 50% of the males. This signifies that following educational intervention, there was an overall improvement in scores for female students over that for males. (Figure 2)

**Figure 2: Box plot of gender differences in correct responses in pre- and post-tests**



### 3.3. Source of information on TB

The main sources of TB-related information were television (50.98%) and the Internet (27.45%) and the gender differences were not significant.

## 4. Discussion

A total of 51 Humanities students had given written informed consent to participate in the study. The low number of willing participants may be ascribed to inadequate awareness about the magnitude of TB in the country.

### 4.1. Awareness

In the pre-test, considering that the students were from non-science background, they seemed to have a satisfactory level of knowledge and the lowest correct response (Mean=0.588; SD=0.497) pertained to the question on curability of TB. The substantial increase in correct responses in the post-test implied that the educational intervention had resulted in increase in knowledge across several cognitive domains. A study [14] conducted in Vellore, Tamil Nadu, has reported that simple educational intervention using a 30-minute, audio-visual presentation and distributing pamphlets to the 271 participating students increased the mean scores across knowledge domains, such as, modes of spread, signs and symptoms, and diagnostic test of choice for TB. In an Oman-based study on 133 Arts and Social Science students, [15] the students knew that TB afflicted multiple organs (73%) and that tuberculin testing was a non-obligatory diagnostic test (39%) but, only 25% knew that a TB-infected person could remain asymptomatic for life.

In contrast, inadequate awareness about TB among students has been reported by studies conducted in Ahmednagar district, Maharashtra, [16] Sudan, [17] Rio de Janeiro, Brazil, [18] Kwara state, Nigeria, [19] Trinidad and Tobago, [20] Belgrade, Serbia [21] and Saudi Arabia. [22] As compared to the student population group, the general urban population group in two cities of Croatia had higher levels of TB-related awareness [23] An American study [24] found that older people are more likely to give correct answers to TB-related questions.

### 4.1. Gender

In the present study, the males had higher scores in the pre-test but the post-test showed an overall improvement in scores for female students over that for males. Gender-wise differences across knowledge domains were reported by a study [25] on 839 non-medical university students in Bangladesh: male students were more aware about TB disease, latent TB and its treatment while females had more knowledgeable about the causative agent, BCG vaccine and curability of TB. While higher levels of awareness among male students have been reported by some studies,

[11,16,26] contrasting results (higher awareness among female students) have been revealed by researchers from Malaysia [27] and Oman. [15] However, a study [28] on 1,137 non-medical university students in Lahore, Pakistan, has found that there was no gender difference in the average TB-related knowledge.

#### 4.2. Source of information on TB

A slender majority (50.88%) of respondents in the present study identified television as their main source of TB-related information. Similar results have been obtained by studies from Iran, [26] Malaysia, [27] Vietnam, [29] and Ethiopia. [30] Contrasting results were obtained in a study on students from Belgrade, Serbia wherein a majority trusted doctors as a source of health-related information while 5.8% preferred the Internet. [21]

### 5. Limitations

The respondents belonged to a diverse group who were studying varied subjects under the category of "Humanities". Moreover, only 51 students consented to participate in the study. For these reasons, generalisation of the findings would be constrained.

### 6. Conclusion

Male students had higher scores in the pre-test but the post-test showed an overall improvement in scores for female students over that for males. After educational intervention, there was an overall improvement in the scores obtained by both male and female students. Awareness among undergraduate students regarding various aspects of TB indirectly indicates the level of awareness in their less educated age-cohorts and family members. Focussed educational interventions ought to emphasise case detection and management of contacts of TB patients.

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