

## A study on impact of curriculum on knowledge of tuberculosis among medical students

B. Nagasrilatha<sup>1,\*</sup>, M. Sasidhar<sup>2</sup>, M. Bharathi<sup>3</sup>, A. Sasikala<sup>4</sup>, S. Kusuma Bai<sup>5</sup>

<sup>1,3</sup>Associate Professor, <sup>2</sup>Professor, <sup>4,5</sup>Assistant Professor, Rajiv Gandhi Institute of Medical Science

**\*Corresponding Author:**

Email: lathabathala77@gmail.com

### Abstract

India has the highest burden of tuberculosis (TB) in the world with over 2 million incident cases amounting to more than 1/5th (21%) of the global burden. With proper care and treatment, TB patients can be cured. But inadequate case detection and poor treatment continue to be some of the major factors for the increasing burden of TB globally. Medical colleges play a central role in training and shaping the attitudes of medical students. Societies expect these institutions to train students to competently and holistically while handling common health problems.

A Prospective study was conducted to assess the knowledge and awareness of medical students and effectiveness of curriculum on tuberculosis at RIMS Medical College, Kadapa, Andhra Pradesh in April and July 2016. 150 students of first clinical students were included after taking their consent. A questionnaire having 20 items of closed ended were administered. Base line knowledge was assessed by pretest evaluation. Post-test evaluation was done 7 weeks after teaching curriculum for two hours.

The knowledge of students after teaching curriculum regarding tuberculosis was high in all aspects when compared to pre intervention.

1. All participants knew that Mycobacterium tuberculosis is the causative agent for tuberculosis.

2. Awareness of students on tuberculosis was improved in post-intervention assessment.

3. Few students 24.6% of participants only knew about gohn focus. 4. Students' knowledge about pathogenesis and immunoprophylaxis still needs intervention.

**Keywords:** Tuberculosis, Medical Students, Curriculum.

### Introduction

India has the highest burden of tuberculosis (TB) in the world with over two million incident cases amounting to more than 1/5th (21%) of the global burden.<sup>(1)</sup> One-third of the world's population is already infected with the TB bacterium.<sup>(2)</sup> In India, today two deaths occur every three minutes from tuberculosis but these deaths can be prevented. With proper care and treatment, TB patients can be cured.<sup>(3)</sup> As HIV-sero positivity tends to adversely amplify the severity of other immune compromised conditions such as TB, the real incidence is likely to be even higher. But inadequate case detection and poor treatment continue to be some of the major factors for the increasing burden of TB globally.<sup>(4)</sup> WHO recognizes the importance of tuberculosis-related knowledge, attitude and practice surveys in advocacy, communication, and social mobilization strategy planning.<sup>(5)</sup> Medical colleges play a central role in training and shaping the attitudes of medical students who hold the promise of providing health care services to the community in near future.<sup>(5,6)</sup> Medical students have to be made aware of community concerns, especially sensitivities, attitudes and also issues relating to medical ethics.<sup>(7)</sup> Societies expect these institutions to train students to competently and holistically while handling common health problems.<sup>(8)</sup> As few studies have been conducted to test the awareness of medical students regarding the knowledge on tuberculosis we made an attempt to find out the knowledge on

tuberculosis among medical students in first clinicals of RIMS Medical College, Kadapa, Andhra Pradesh.

### Aims and Objectives

1. To know the awareness on tuberculosis among medical students in 1<sup>st</sup> clinical year.
2. To know the impact of curriculum in gaining the knowledge on tuberculosis.

### Materials and Methods

A prospective study was conducted at RIMS Medical College, Kadapa, Andhra Pradesh in April and July 2016. Willingness of participation was taken and it was stressed that without discussions answering should be done. 150 students of 1<sup>st</sup> clinical medical students were participated in the study. 20 items of open ended questions were administered for both pre & post-test evaluation. Questionnaire was prepared to assess the knowledge of participants on causative agent of tuberculosis, its pathogenesis, diagnosis, prophylaxis, govt. programmes, anti-tuberculosis drugs, drug resistance. Pretest evaluation was done to assess base line knowledge. 7 weeks after teaching curriculum which included brief history, pathogenesis, lab diagnosis, treatment and immunoprophylaxis of Tuberculosis for two hours by power point presentation, post-test evaluation was done.

**Statistical analysis:** The obtained data was entered in MS excel to perform T test and Chi-square test (2X2 contingency table) was used for analyzing the data.

## Results

Almost all participants knew that Mycobacterium tuberculosis is the causative agent for tuberculosis. Knowledge on pathogenesis of the disease was improved. But still only 24.6% of participants were able to answer correctly for Ghon focus even after curriculum as shown in Table 1. Participants of 54.6% and 96.6% answered that early morning sputum is collected for diagnosis of pulmonary tuberculosis before and after curriculum respectively. But for rest of the items on lab diagnosis only around 20% of participants had

knowledge before curriculum which was improved after curriculum on all aspects of lab diagnosis of tuberculosis as shown in Table 2.

Knowledge on anti-tuberculosis drugs was improved from 50% to 70% after curriculum. 56% of participants were able to mention correctly as BCG is the vaccine for TB and it is administered by intradermal route after curriculum as shown in Table 3.  $t = 4.08$ ; Standard deviation = 33.8 Degrees of freedom=46, the probability of this result, assuming the null hypothesis, is 0.0002.

**Table 1: Showing knowledge among medical students on agent and pathogenesis of tuberculosis before and after curriculum**

	Before curriculum (n=150)	After curriculum (n=150)	p value	X <sup>2</sup> value
Agent for Tuberculosis	149(99.3%)	150(100%)	0.8	Not significant
Scientist, who isolated the bacilli	43(28.6%)	67(44.6%)	=0.01	7.593
Source of infection for TB	10(6.6%)	54(36%)	<0.0001	36.725
Most common mode of transmission	99(66%)	137(91.3%)	<0.0001	27.191
Ghon focus	4(2.6%)	37(24.6%)	<0.0001	28.929
Most common extra pulmonary organ	13(8.6%)	62(41.3%)	<0.0001	40.960
World TB day	39(26%)	70(46.6%)	<0.0001	12.969

**Table 2: Showing knowledge on lab diagnosis of tuberculosis**

	Before curriculum (n=150)	After curriculum (n=150)	p value	X <sup>2</sup> value
Ideal sample for diagnosis of Plu. TB	82(54.6%)	145(96.6%)	<0.0001	69.591
Most common staining technique	31(20.6%)	103(68.6%)	<0.0001	67.987
Selective media for TB bacilli	32(21.3%)	95(63.3%)	<0.0001	52.487
Generation time of TB bacilli	23(15.3%)	52(34.6%)	=0.001	13.938
Intra dermal test done for TB	35(23.3%)	87(58%)	<0.0001	35.932
Type of hyper sensitivity	47(31.3%)	81(54%)	<0.0001	14.839
Experimental animal for TB	14(9.3%)	71(47.3%)	<0.0001	51.480

**Table 3: Showing knowledge on treatment and prophylaxis of tuberculosis**

	Before curriculum (n=150)	After curriculum (n=150)	p value	X <sup>2</sup> value
Anti-tuberculosis drugs	74(49.3%)	105(70%)	<0.0001	12.466
Mentioned 1 drug	46(30.6%)	27(18%)	<0.0001	5.866
Mentioned 2 drugs	24(16%)	45(30%)	<0.0001	7.529
Mentioned $\geq$ 3 drugs	5(3.3%)	43(28.6)	0.08	33.953
RNTCP	13(8.6%)	100(66.6%)	<0.0001	105.002
DOTS	8(5.3%)	81(54%)	<0.0001	82.816
MDRTB	31(20.6%)	110(73.3%)	<0.0001	81.413
Type of resistance	46(30.6%)	64(42.6%)	=0.04	4.148
BCG	43(28.6%)	34(22.6%)	0.07	Not significant
BCG+ID	37(24.6%)	84(56%)	<0.0001	29.309

**Table 4: Showing various statistical parameters – before and after curriculum**

Statistical parameter	Before curriculum	After curriculum
Standard deviation	33.5	34.2
Mean	39.5	79.3
Median	33.5	76.0
Hi	149	150
Low	4.00	27.0
Average Absolute Deviation from Median	22.2	27.2

$t = 4.08$ ; Standard deviation = 33.8 Degrees of freedom=46,

The probability of this result, assuming the null hypothesis, is 0.0002

## Discussion

Mycobacterium tuberculosis, the causative agent for tuberculosis was isolated in 1882 by Robert Koch.<sup>(9)</sup> Disease tuberculosis is also known as Koch's disease. In present study only 44.6% of participants knew the scientist, who first isolated the organism. Even though Tuberculosis is both preventable and treatable, but still continues to be the world's leading cause of death from an infectious agent. India is the highest TB burden country in the world.<sup>(10,6,11)</sup> It has been known to have devastating effects on the socio-economic development due to its association with the dreaded disease like human immunodeficiency virus/ acquired immunodeficiency syndrome and malnutrition in the poorest of the poor.<sup>(12)</sup>

Still as per WHO Global TB Report, 2015, out of the estimated global annual incidence of 9.6 million TB cases,<sup>(13)</sup> India constitutes about 1/5<sup>th</sup> of the global tuberculosis incident cases and nearly 2 million people in the nation develop tuberculosis, of which around 0.87 million are infectious cases.<sup>(10)</sup>

The World Health Organization (WHO) has published guidelines for TB control in low income countries. But inadequate case detection and poor treatment continue to be some of the major factors for the increasing burden of TB globally.<sup>(4)</sup> RNTCP has made historical achievements in the recent past years and the program stands at the point where achieving the ambitious goal of universal access to TB care is in sight. The program has reached in every corner of the country and operational through the primary health care system.<sup>(10)</sup> Involvement of medical colleges in the RNTCP is a high priority. Continuing success of RNTCP requires involvement of all large providers of health care including medical colleges. Under RNTCP Medical Colleges play important roles in service delivery, advocacy, training and operational research.<sup>(14)</sup> Despite such a successful program, gross lacunae have been observed in the knowledge of future budding doctors.<sup>(15)</sup> Medical colleges play a central role in training and shaping the attitudes of the future generations of medical practitioners. The onus lies on the medical colleges and the curriculum so as to produce well trained and skilled medical practitioners.<sup>(6)</sup>

Our study was aimed to know the impact of curriculum in gaining the knowledge on tuberculosis among 1<sup>st</sup> clinical medical students as they have good period of clinical postings in obtaining the knowledge on communicable diseases in their areas. 91.3% of participants mentioned correctly as inhalation of infected droplets is the most common mode of transmission for tuberculosis in present study which is near to a study by Amita et al (98.7%) whereas it was more when compare to a study by Basu et al (65.4%).<sup>(6,1)</sup> Following inhalation of Mycobacterium tuberculosis a small subpleural lesion develops called Ghon focus.<sup>(16)</sup> After curriculum only

24.6% of participants knew about Ghon focus in the present study which can be improved in their clinical postings. The most common extra pulmonary site of tuberculosis is lymphnodes.<sup>(16)</sup> The awareness on the extra pulmonary organ was improved from 8.6% to 41.3% after curriculum. To compare this data there are no available studies in knowledge on expulmonary tuberculosis. Participants of 96.6% knew that early morning sputum is collected for diagnosis of pulmonary tuberculosis after curriculum but it was less in a study by Amita et al (71.01%).<sup>(6)</sup> Regarding Zeihl – Neelsen staining (acid fast staining), which is most common staining done for TB bacilli, 68.6% of participants mentioned correctly, whereas it was 86.11% and 91% in studies done by R. Bogam et al<sup>(3)</sup> in post graduate medical students and Basu et al<sup>(1)</sup> respectively. As the present medical students are future clinical practioners, they should have knowledge on the period required for obtaining colonies on selective medium (Lowenstein – Jensen medium) and the reason for long duration to form colonies. Only 63.3% and 34.6% of participants answered correctly for the selective medium and generation time of TB bacilli, even after curriculum.

Tuberculin test was discovered by Von Pirquet in 1907. A positive reaction of the test is generally accepted as evidence of past or present infection by Mycobacterium tuberculosis. It is the only means of estimating the prevalence of infection in a population.<sup>(17)</sup> 58.8% of participants knew that Mantoux test is the intradermal test done and 54% of participants also knew that it is a delayed hypersensitivity reaction in the post-curriculum evaluation but it was less (23.3% & 31.3%) before curriculum.

However, there is a dearth of data regarding the level of knowledge about TB and DOTS among medical students and interns who are the budding doctors and can make an impact on TB control. Hands on experience and RNTCP training is essential so as to transform the attitudes and build the skills and increase the knowledge levels of these budding doctors, this will help in preventing the irrational and inadequate use of TB drugs.<sup>(6)</sup> In India, more than 360 out of about 390 medical colleges are involved (formation of core committee, DMC and DOT Center) under RNTCP.<sup>(14)</sup> In the present study 66.6% and 54% of participants knew about RNTCP & DOTS respectively. But it was 94.8% in a study by Basu et al for RNTCP.<sup>(10)</sup> As the present study was done on 1<sup>st</sup> clinical medical students they might not had awareness on government programmes. 50% of participants mentioned anti tuberculosis drugs even before curriculum and it was improved to 70% after curriculum in our study. Drug-resistant TB has microbial, clinical, and programmatic causes. From a microbiological perspective, the resistance is caused by a genetic mutation that makes a drug ineffective against the mutant bacilli. An inadequate or poorly administered

treatment regimen allows drug-resistant mutants to become the dominant strain in a patient infected with TB.<sup>(18)</sup> In the present study 73.3% of participants knew about MDRTB but only 42.6% of them mentioned that the organism exhibits mutational drug resistance after curriculum.

Immunoprophylaxis for tuberculosis is by intradermal injection of BCG, an attenuated vaccine derived from mycobacterium bovis, which was developed in 1921 by Albert Calmette and Camille Guerin.<sup>(21)</sup> Its protective efficacy is up to 80% for 10 to 15 years.<sup>(17)</sup> In the present study 24.6% and 56% of participants knew that BCG is the vaccine and it is administered by intra dermal route before and after curriculum respectively.

The WHO guidelines could help to update the medical curriculum to include the teaching of tuberculosis as a core subject. Medical schools are expected not only to teach and provide care, based on sound rationale and evidence from operational and behavioral research, but also to provide assistance to national programmes in the areas of policymaking, situational analysis and monitoring. Medical schools should provide learning opportunities to medical students in all aspects of tuberculosis, with particular reference to diagnosis and management, in accordance with the national TB control programme guidelines. Medical schools should undertake both basic and operational research in order to improve the efficiency of the national TB control programmes and to develop newer diagnostic, treatment and preventive strategies for TB control including vaccine research.<sup>(7)</sup> All these can be expected whenever there is effective curriculum and it should be updated frequently.

Impact of effective modern medical education will lead to influence the medical graduates in various spectrums of disease conditions observed in clinical practice with collaborative teaching which will enlighten the students.

### Conclusions

1. All participants knew that Mycobacterium tuberculosis is the causative agent for tuberculosis.
2. Awareness of students on tuberculosis was improved in post-intervention assessment.
3. Few students 24.6% of participants only knew about gohn focus.
4. Students' knowledge about pathogenesis and immunoprophylaxis still needs intervention.

### References

1. Basu M, Das P. Assessment of knowledge regarding tuberculosis in the context of revised national tuberculosis

- control program among budding doctors. *Chron Young Sci* 2014;5:59-64.
2. A.A. Al-Jabri, A.S.S. Dorvlo, S. Al-Rahbi, J. Al-Abri and S. Al-Adawi: Knowledge of tuberculosis among medical professionals and university students in Oman Eastern Mediterranean Health Journal, Vol. 12, No. 5, 2006.
3. Rahul R Bogam, Sunil M Sagare Knowledge of tuberculosis and its management practices amongst postgraduate medical students in Pune City; *National Journal of Community Medicine* 2011 Volume 2 Issue 1: Page 52 – 59.
4. O Busari, A Adeyemi, O Busari.: Knowledge of tuberculosis and its management practices among medical interns in a resource-poor setting: implications for disease control in sub-Saharan Africa. *The Internet Journal of Infectious Diseases*.2007 Volume 6 Number 2.
5. Giri PA, Phalke DB.: Impact of sensitization workshop on knowledge regarding tuberculosis among final year medical students. *Int J Med Public Health* 2013;3:100-2.
6. Amita Kutare, Margaret Rosario, Nagaraj Goudb: A Study on Knowledge of Tuberculosis, DOTS and MDR-TB among Interns of Medical Colleges in Bangalore *International Journal of Health Sciences& Research* Vol.2; Issue: 3; June 2012.
7. Enhancing the Role of Medical Schools in STI/HIV and TB Control, Report of an informal Consultation Chennai, India, 5–7 July 2000; WHO project.
8. Melflor Aldovino Atienza et al Development of a Core Curriculum on Tuberculosis Control for Philippine Medical Schools *Ann Acad Med Singapore* 2007;36:930-6.
9. Ananthanarayan & Paniker's Textbook of Medical Microbiology, 9<sup>th</sup> edition; Chapter:38;page:345 .
10. S. Sangeetha Balamurugan1, Swaminathan2,Sivaji Rao3: The Awareness about Tuberculosis and DOTS among the Aspiring Doctors in a Tertiary Medical College Hospital, Salem, Tamil Nadu *National Journal of Research in Community Medicine*. Vol. 2. Issue 2. July-Sep. 2013 (079-148).
11. TB India 2011, Revised National TB control Programme, Annual Status report. Accessed from <http://www.tbcindia.org>.
12. Central TB Division. TB INDIA 2012:Revised National TB Control Programme, Annual Status Report. New Delhi, India: Directorate General of Health Services, Ministry of Health and Family Welfare, Nirman Bhawan; 2012. p. 1-17. Available from: <http://www.tbcindia.nic.in> (Last accessed on 2013 Mar 29).
13. TB India 2016, RNTCP, Annual status report, Chapter 2 – TB Disease burden in India; page 9.
14. TB India 2016, RNTCP, Annual status report, Chapter 5 – Partnerships; page 42.
15. Mehta D, Bassi R, Singh M, Mehta C. To study the knowledge about tuberculosis management and national tuberculosis program among medical students and aspiring doctors in a high tubercular endemic country. *Ann Trop Med Public Health* 2012;5:206-8.
16. Davidson's Principles and practice of Medicine; 22<sup>nd</sup> edition; chapter: 13; page 688;690.
17. Park's Text book of Preventive and Social medicine; 22<sup>nd</sup> edition; Chapter 5 – Epidemiology of Communicable diseases; Tuberculosis: page:172;179.
18. RNTCP, DOTS- PLUS guidelines, Jan 2010 page 3.
19. Manson's tropical diseases; 22<sup>nd</sup> edition; Chapter 57- Tuberculosis; page 1033.