Original Article

Assessment of knowledge regarding tuberculosis in the context of revised national tuberculosis control program among budding doctors

Abstract

Background: India has the highest burden of tuberculosis (TB) in the world with over 2 million incident cases (21% of the global burden). Future physicians should correctly diagnose, treat the cases to prevent the development of newer cases. **Materials and Methods:** The observational, cross-sectional study was conducted in 2012 among 172 interns. Study tool was an English language, pre-designed, pre-tested, self-administered, semi-structured questionnaire. Study variables were multiple including different aspects of TB knowledge. Then, data were collected from them. Finally, the collected data were tabulated, analyzed and interpreted by proper statistical methods (by percentage). **Results:** The response rate was 88.4%; mean age was 23.8 (standard deviation ±1.5) years, ranged from 22 to 28 years. A majority of interns (65.4%) correctly identified droplet infection as the chief mode of transmission of pulmonary TB (PTB). Again 65.4% interns correctly mentioned coughing for 2 weeks or more as the most important symptom of PTB. Majority (91.0%) correctly responded sputum examination for acid fast bacilli for diagnosis. Only a few respondents (25.6%) were able to narrate correct categorization of TB. More than 3/4th (76.9%) could correctly name all the five first line anti-TB drugs used in directly observed treatment, short-course (DOTS). **Conclusion:** The most worrisome finding was the lack of proper knowledge about TB transmission. Poor level of knowledge can prevent the future medical practitioners from suspecting TB. The present study was found comparable with many other study findings. The respondents had moderate knowledge regarding treatment monitoring. There is an urgent need for the huge increase in awareness of DOTS among budding doctors.

Key words:
Interns, tuberculosis knowledge, West Bengal Medical Colleges

Introduction

India has the highest burden of tuberculosis (TB) in the world with over 2 two million incident cases amounting to more than 1/5th (21%) of the global burden. 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. Drug resistance, diabetes, smoking and other associated factors complicate TB scenario further making it difficult to control.[1] During the 1950s and 1960s, significant research on TB was undertaken in India and in 1962 the National Tuberculosis Control Program (NTP) was launched. Three decades later in 1992, a review of the NTP revealed that only 30% of existing TB cases were being diagnosed, and of these only 30% were completing treatment. On the recommendations of an expert committee, a revised strategy to control TB was pilot tested in 1993 applying the WHO recommended directly observed treatment, short-course (DOTS) strategy which was expanded in a phased manner to cover the entire country in 2005.[2] Since 1998

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Revised National Tuberculosis Control Program (RNTCP) has treated more than 14.2 million TB cases and saved additional 2.6 million lives using the DOTS strategy.[1] It has moved beyond the objectives of a treatment success rate of more than 85% in new smear positive patients and detecting 70% of such cases consecutively for the last 5 years and had set a new objective of "Universal Access to Quality Tuberculosis Care in India".[1] Key focus of the program is to prevent the emergence of drug resistance by the provision of quality DOTS services. For this rational use of anti-TB drugs by every health care provider DOTS services needs to be ensured. This responsibility when exercised properly will prevent the development of drug resistant TB and will accelerate TB control.[1]

Although some studies in India[3-8] have documented inadequate TB knowledge among practicing physicians, such studies among medical interns are very few in our country.[9-12] With this view of context, the present study was carried out to assess the knowledge and awareness about various aspects of TB among junior doctors (future physicians) of tertiary care hospitals of West Bengal and their adherence to the RNTCP guidelines in India and hence that this current status of knowledge can help the authority to develop the strategy for improving the situation in the future.

Materials and Methods

Type of the study was observational, descriptive, institution based, epidemiological study. Study design was cross-sectional in nature. Study period was October 2012. Study population was 172 interns of two tertiary care hospitals of West Bengal. Study setting was two tertiary care teaching hospitals. Study tool was an English language, pre-designed, pre-tested, self-administered semi-structured questionnaire containing both open ended and close ended questions. The first section recorded some background information (age, sex etc.). The second section assessed TB knowledge based on the DOTS strategy and RNTCP. Sample size was 172. Sampling technique was purposive sampling. Study variables were age, sex, residence, per-capita monthly income, exposure to active TB cases, previously attended to any lectures on TB, TB training received or not, different aspects of TB knowledge (acronym of RNTCP and DOTS, objectives of RNTCP, components of DOTS, mode of transmission, commonest symptom, best tests for diagnosis of pulmonary TB (PTB) and for monitoring of treatment, categories of TB treatment, the recommended anti-TB regimen in the intensive and continuous phases, duration of treatment, intermittent regimen, drug contraindicated in pregnancy, drugs contraindicated in jaundice, isoniazid (INH) prophylaxis, definition of multidrug-resistant-TB [MDR-TB], extensively drug-resistant-TB [XDR-TB]). Study technique: Before actual study, a questionnaire was designed in consultation with three experts on the subject and pre-testing of the same was done to assure its validity. Necessary correction and modification was adopted in the questionnaire for smooth operation in data collection.

Interns were informed about the purpose of the study and their informed verbal consent was taken. They were assured about their confidentiality and anonymity. Then, data were collected from them by administering the questionnaire, which were completed under the supervision without allowance for discussions. To prevent interns from studying the subject in anticipation, the questionnaires were distributed without advance notice. Interns were allowed up to 30 min to complete the questionnaires responses without outside assistance. Finally, the collected data were tabulated, analyzed and interpreted by proper statistical methods (by percentage). Inclusion criteria: Those interns who were willing to participate in the study and were present on that day of data collection. Exclusion criteria: Those not willing to participate and absent on the day of study and had active TB were excluded.

Results

This study involved tertiary care teaching hospitals of West Bengal in which interns were studied regarding the level of basic knowledge about TB.

Background data of participants [Table 1]: Of 172 registered interns, 14 did not volunteer to participate or were absent

Table 1: Distribution of the study population according to socio-demographic profiles (n = 156)

General profiles	Number	Percentage
Age (in years)		
22-24	92	59.0
24-26	36	23.1
26-28	28	17.9
Gender		
Male	94	60.3
Female	62	39.7
Exposure to active TB cases		
Yes	28	17.9
No	128	82.1
Place of residence		
Day-scholar	48	30.8
Hostel resident	108	69.2
Per-capita monthly income (Rs.)		
< 5000	20	12.8
5000-20,000	96	61.6
> 20,000	40	25.6
Previously attended lectures on TB		
Yes	120	76.6
No	36	23.1
Any training of TB received		
Yes	30	19.2
No	126	80.8

TB – Tuberculosis

on the day of the survey and another 2 were excluded (two had active TB). 156 questionnaires were returned with completed responses. Thus, the response rate was 88.4%; out of which 39.7% were females and 60.3% males with the mean (standard deviation [SD]) age was 23.8 (SD ±1.5) years, ranged from 22 to 28 years; majority of the study population were in the age group of 22-24 years (59.0%) and hostel residents (69.2%). 61.6% had their per capita monthly income of Rs. 5000-20,000. Only 19.2% interns received any TB training and only 17.9% had exposure to active TB cases. However 76.6% attended lectures on TB during their undergraduate curriculum.

Knowledge about TB [Table 2]: Modes of transmission and symptoms: A majority of interns (65.4%) correctly identified droplet infection as the chief mode of transmission of PTB. Again 65.4% interns correctly mentioned coughing for 2 weeks or more as the most important symptom of PTB.[2] Other answers included fever, chest pain, dyspnea and hemoptysis.

Diagnosis and follow-up: When asked about the best tool for diagnosing TB under RNTCP, majority (91.0%) correctly responded sputum examination for acid fast bacilli (AFB)[2] while 7.5% proposed chest X-ray. About 56.5% thought that the best test for follow-up of cases with PTB was sputum microscopy for AFB[2] while 2/4th (40.3%) thought it was chest X-ray. The number of sputum specimens (2) required for diagnosis under RNTCP was responded correctly[2] by more than half of the study population (51.3%), whereas the timing (spot and early morning)[2] of sputum specimen collection was responded correctly by only 1/5th (21.8%).

Treatment and management: Only a few respondents (25.6%) were able to narrate correct categorization of TB patients in two categories.[2] Again 25.6% study population knew that treatment under RNTCP given in two phases and correct duration of treatment for cat I and cat II TB cases. Out of 78 interns, more than 3/4th (76.9%) could correctly name all the five first line anti-TB drugs used in DOTS.[2] However when asked about the DOTS regimens,[2] it was known correctly to 56.4% of the study population for cat I and 50.0% cat II. More than half (57.7%) respondents correctly stated that DOTS therapy is given thrice a week intermittently.[2] Also more than three-fourth interns, 84.6% were aware that DOTS caters to all age groups. On the question about an asymptomatic child <6-year-old of a mother with active PTB, 53.8% would recommend INH prophylaxis.[2] On how to manage a female patient on anti-TB drugs who become pregnant, 50.0% thought that anti-TB drugs should be continued but without the use of streptomycin (SM).[2] Almost two third (65.3%) interns knew

Table 2: Distribution of the study population according to knowledge of TB (*n* = 156)

Knowledge item	Number of correct responses	Percentage
Usual mode of transmission (droplet infection, droplet nuclei)	102	65.4
Most common symptom (persistent cough of two weeks or more, with or without expectoration)	102	65.4
Best test for diagnosis under RNTCP (sputum smear microscopy for AFB)	142	91.0
No. of sputum specimens required for diagnosis under RNTCP (two)	80	51.3
Correct timing of sputum collection (spot and early morning)	34	21.8
Number of treatment groups (two; new* and previously treated**)	40	25.6
Drugs and doses used in cat I (IP [$2H_3R_3Z_3E_3$]; CP [$4H_3R_3$])***	88	56.4
Drugs and doses used in cat II (IP [$2H_3R_3Z_3E_3S_3$]/[$1H_3R_3Z_3E_3$]; CP [$5H_3R_3E_3$])***	78	50.0
DOTS given thrice a week on alternate days	90	57.7
Name first line anti TB drugs (H/R/Z/E/S)	120	76.9
Duration of anti-TB treatment(cat I-6 months; cat II-8 months)	40	25.6
DOTS caters to all age groups	132	84.6
Advice given to children aged 6 years and below who are in contact with smear positive pulmonary TB case (INH prophylaxis)	84	53.8
DOTS given in 2 phases (IP and CP)	42	26.9
Tool for treatment monitoring (sputum smear microscopy)	90	57.7
Define the acronym for RNTCP	148	94.8
Define the acronym for DOTS	148	94.8
Describe the DOTS components	50	32.0
Describe the objectives of RNTCP	80	51.3
Define the term MDR-TB	142	91.0
Define the term XDR-TB	0	0.0
Anti-TB drug contraindicated in pregnancy-(streptomycin)	78	50.0
Anti-TB drugs that should be stopped in jaundice-(all)	102	65.4

*New includes former categories I and III; **Previously treated is former category II; ***The number before the letters refers to the number of months of treatment. The subscript after the letters refers to the number of doses per week. RNTCP – Revised national tuberculosis control program; DOTS – Directly observed treatment, short-course; MDR-TB – Multidrug-resistant tuberculosis; TB – Tuberculosis; INH – Isoniazid (H); AFB – Acid-fast bacilli; IP – Intensive phase; Extensively drug-resistant tuberculosis; CP – Continuation phase

the fact that all drugs were contra-indicated in patients with jaundice.[2]

RNTCP, DOTS, MDR-TB and XDR-TB: Most interns (94.8%) were able to define the RNTCP and DOTS acronym[2] while only 51.3% were able to identify the objectives of RNTCP.[2] and only 32.0% could identify the five components of DOTS.

Almost all (91.0%) interns could state correctly the definition of MDR-TB[2] (TB bacilli resistant to isoniazid (H) and rifampicin (R) with or without resistance to other drugs) while none of them was aware of the definition of XDR-TB[2] (is a subset of MDR-TB where the bacilli, in addition to being resistant to R and H, are also resistant to fluoroquinolones and any one of the second-line injectable drugs (namely kanamycin, Capreomycin or Amikacin).

Discussion

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. In rural India, at least one trained "community DOT provider" is in place in every village to provide DOT services. Despite all this, due to the different health seeking behavior pattern in urban areas, TB control faces unique challenges. Better involvement of all relevant health-care providers in TB care and control through the public-private mix approaches is crucial to achieve the objective of "universal access".[1]

In the present study, the most worrisome finding was the lack of knowledge about TB transmission, as only two-third of the interns correctly answered TB transmission. However interns in India (Bangalore),[11] Nigeria,[13] Pakistan[14] and Iran[15] were somewhat better informed, with 98.7%, 88.1%, 96% and 85% respectively knew that droplet infection was the usual mode of transmission compared with 65.2% in our study. A study among interns in Delhi[10] showed poor knowledge about the mode of transmission, with only 4.2% correctly identified TB as a droplet infection.

Cough for 2 weeks or more-the cardinal symptom for PTB was known to only 38.1% interns in Bangalore[11] and 40% interns in Iran.[15] This poor level of knowledge can prevent the future medical practitioners from suspecting TB in a patient with this symptom of cough for 2 weeks or more. On the other hand, in the present study (65.2%) and other studies in Davangere city by Jayaprakash (71.0%),[5] Varodara by Baxi and Shah (88.8%),[7] Jamnagar by Yadav *et al.* (100.0%),[8] Delhi by Rajpal *et al.*[10] and Pune by Bogam and Sagare (88.8%),[12] physicians, medical interns and post graduate students were very knowledgeable about the presenting symptoms of PTB.

The role of sputum examination as a simple, cheap, sensitive and specific test has been well proven in the RNTCP. Unless the doctors themselves are aware, they can't be expected to teach students about the importance of sputum examination as the most reliable diagnostic tool. However, unlike the findings from some studies,[10,11,13-15] it was disappointing that maximum interns in this study (91.3%) correctly recognized sputum smear microscopy as the best diagnostic tool for PTB. This high level of knowledge could be due to continuous reinforcement by the Government through the health education messages as well as the increase stress laid on sputum microscopy in the medical curriculum.

The respondents had moderate knowledge regarding treatment monitoring: 56.5% were aware of sputum microscopy for AFB as a monitoring tool. Their counterparts in Pune,[12] Nigeria,[13] Pakistan[14] and Iran[15] were less informed with 41.6%, 46.6%, 3.5% and 6.3% respectively.

It was noted in the present study that 52.2% participants knew correctly the number of sputum samples required and 21.7% knew the proper timing of sputum collection. Corresponding figures among interns, postgraduate students and private practitioners were in Hoogly by Datta *et al.* (26%),[3] in Nagpur by Khadse *et al.* (26.1%),[4] in Davangere by Jayaprakash (58.0%),[5] in Kolkata by Dasgupta and Chattopadhyay (43.8%),[6] in Varodara by Baxi and Shah (30.7%),[7] in Jamnagar by Yadav *et al.* (21.4%),[8] in North India by Mehta *et al.* (57.0%),[9] and in Pune by Bogam and Sagare (52.7%),[12] correct method of sputum collection was known to about 42.5%[9] and 44% of the participants[6] respectively.

The correct categorization of TB patients was done by only 26.8% of respondents in this study which was less than the findings seen by Mehta *et al.* (56.0%)[9] but more than Charkazi *et al.* (7.5%).[15]

A study by Jayaprakash[5] revealed that 74.6% study population knew that the treatment for TB was given in two phases intensive phase (IP) and continuation phase (CP); not consistent with the present study (26.8%).

Again 26.8% interns of the present study stated that under RNTCP guidelines, the therapy for TB should last for 6 and 8 months respectively for Cat I and Cat II; quite below the study by Jayaprakash (70.0%).[5]

Three-fourth participants (76.6%) could name all the primary anti-TB drugs stated in the RNTCP guidelines which was much more than the finding of Dasgupta and Chattopadhyay at Kolkata (29.2%).[6] and Rajpal *et al.* at Delhi (26.5%).[10]

When asked to write the treatment regimen for each category (drugs and their duration used in the IP and CP),

56.2% for cat I and 50.4% for cat II were correct. Other studies conducted in North India,[9] Pune,[12] Nigeria[13] and Pakistan[14] about the prescribing behavior of interns and postgraduate students reported similar findings. However two studies conducted among interns in India[10] and Iran[15] revealed the rates of correct knowledge of the recommended regimen were only 7.8% and 20.0% respectively. This inadequacy of knowledge about correct prescription may lead to the spread of MDR-TB strains. Hands on experience and RNTCP training is essential to build the skills and increase the knowledge of these budding doctors, which will help to prevent the irrational and inadequate use of anti-TB drugs.

More than half (56.5%) of the study population accurately identified the recommended intermittent mode (thrice a week) of TB treatment as proposed by the RNTCP guidelines; which was dissimilar to result of studies among interns and private physicians by Datta *et al.* (27%),[3] Jayaprakash (27.6%)[5] and Dasgupta and Chattopadhyay (23.2%)[6] and Rajpal *et al.* (48.4%).[10]

It was revealed in the present study that 54.3% of private practitioners were aware of the fact that INH prophylaxis should be given to under six children in contact with active TB as per RNTCP guidelines; which was more or less in line with finding of Bogam and Sagare (41.6%).[12]

Most anti-TB drugs are safe in pregnancy with the exception of SM which is ototoxic to the fetus and should not be used; was not known to more than half of the respondents. The corresponding figures were 77.2%, 55.5% and 46.6% in Bangalore,[11] Pune[12] and Nigeria[13] study.

About 65.7% study population marked pyrazinamide and rifampicin as the agents to be avoided in patients with liver disease; similar to study by Busari *et al.* (55.1%)[13] and Charkazi *et al.* (64.7%)[15] but dissimilar to the finding of Rajpal *et al.* (2.1%).[10]

Correct response regarding the acronym of RNTCP and DOTS was given by 95.6% and 95.2% of the interns respectively; according to Charkazi *et al.* the full form of DOTS given by only 3.8%.[15] In two studies among private practitioners in Nagpur by Khadse *et al.*[4] (68.9% and 35.9%) and Kolkata by Dasgupta and Chattopadhyay[6] (63.9% and 27.0%); the rate was quite lower.

Despite RNTCP being part of their undergraduate studies, 52.1% participants correctly specified RNTCP objectives; a study among post graduate students in Pune by Bogam and Sagare revealed it was 38.8% and 88.8% respectively in pre-training and post-training phase.[12]

Most interns (67.6%) were unable to identify even a single component of directly observed treatment short course (DOTS) strategy; corroborative with the findings of Pune (91.7%),[12] Nigeria (61.0%),[13] and Pakistan (82.0%).[14]

Majority (91.3%) of the study population of the present study could correctly define MDR-TB but none was able to define XDR-TB; however in studies in Bangalore,[11] Pune,[12] Sub-Saharan Africa[13] and Iran[15] among medical interns and postgraduate students, 75.3%, 69.4%, 27.1%, and 42.5% could correctly define MDR-TB and while none was aware of XDR-TB in Nigeria[13] and only 1.4% in Bangalore.[11] Although XDR-TB is a recent issue and was first reported in late 2005, MDR-TB was discovered in the 1990.[16,17]

Limitations

Information about those who did not wish to participate was not collected.

Conclusion

The present study reflected inadequate and incomplete knowledge about TB according to Revised National Tuberculosis Program guidelines among interns of tertiary teaching hospitals of West Bengal in 2012. Thus, there is an urgent need for huge increase in awareness of DOTS among medical students and budding doctors. Similar studies need to be conducted in different parts of the country among interns. This study concludes that TB/DOTS clinic posting and training should be made mandatory for all the medical interns to increase their knowledge and skills for effective management of patients with TB and thereby in the long run preventing the further rise of MDR and XDR-TB cases.

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