ORIGINAL RESEARCH

Multi drug resistant tuberculosis-KAP study among medical interns & postgraduate in tertiary care hospital

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ABSTRACT
Objective: Tuberculosis bacilli are constantly evolving, enabling them to efficiently adapt to new environments and gain multidrug resistance. As a result, treatment of drug resistant tuberculosis is becoming a challenge. Young medical graduates are the future of healthcare workforce in a country. The present study was undertaken with objective to study the Knowledge, Attitude and Practice associated with multidrug resistance in TB among Medical interns & postgraduates at M. R. Medical College, Kalaburagi. **Materials and Methods:** This was a cross-sectional survey conducted by means of pre designed questionnaire. 81 medical interns, 82 postgraduates were interviewed for socio-demographic information and questions about knowledge, attitude and practices regarding multidrug resistance in TB. **Results:** Out of the 163 participants, response rate was 92%. The participants had sound knowledge about MDR TB, but 43% (n=64) were unaware about recent updates in treatment out of which 21 were interns. All participants showed positive attitude towards attending TB training programs. Mere 71% participants practiced using protective masks while attending patients. Few participants (38%) were counseling patients regarding MDR TB and mere (39%) were sending sample for drug sensitivity testing in resistant cases.**Conclusion:** Our study provides an overview of the knowledge, attitudes and practices regarding MDR TB. Survey revealed that most of the participants were clear about the concept of MDR TB. The matter of concern was poor awareness about recent updates in RNTCP guidelines. The study emphasized need for continuous educational interventions necessary to upgrade their understanding, recent advances, as well as change their attitude towards patients.
Key words: Tuberculosis, multidrug resistance, awareness, RNTCP

INTRODUCTION

Tuberculosis (TB) is as old as mankind. It has plagued the humankind throughout known history of humans. It reached epidemic proportions in Europe and North America during the 18th and 19th centuries, earning the abominable epithet, "Captain Among these Men of Death" [1].

It is the most common cause of death due to a single microbial agent worldwide. Known since many decades, TB bacilli was described only a century ago by Robert Koch in 1882[2].It took a century long time after discovery of mycobacterium tuberculosis to develop an effective treatment to combat it. By the end of 20th century drugs like streptomycin, isoniazid and para amino salicylic acid (PAS) started streaming the market and vision to treat TB soon became a reality. The introduction of rifampicin, pyrazinamide and ethambutol subsequently strengthened the fight against TB.

Just when it was felt that TB could be contained, HIV co-infection and drug resistance blew down the hopes of emerging anti-TB programs across the globe. Tuberculosis bacilli started constantly evolving, enabling them to efficiently adapt to new environments and gain multidrug resistance.

According to WHO in 2021, there were an estimated 10.6 million people who fell ill due to TB cases worldwide reversing the slow decline in TB cases over past decade. This may be attributed to under-reporting and disruption of essential TB services across the globe during the pandemic. Two thirds burden of disease was borne by eight countries India,

Indonesia, China, Philippines, Pakistan, Nigeria, Bangladesh and Democratic Republic of the Congo. Out of these India's share to disease burden is 28%. Globally the estimated proportion of people suffering from MDR/RR-TB resistance was 3.6% among newly diagnosed cases and 18% among those previously being treated. Among the top 3 countries (India, Russian federation and Pakistan) which contribute to 42% of resistant TB cases India's share is 26%[3].

The incidence of TB in India is 188 cases per lakh per year in 2020 and the mortality due to TB is 37/lac/year in 2020[4]. As per the reports estimated number of MDR/RR-TB cases in India is 124 000 (9.1/lakh population). The Revised National Tuberculosis Control Programme (RNTCP) notified around 1.94 million TB patients in 2016. Incidence of MDR-TB is 6.19% among all TB patients with 2.84% among new and 11.60% among previously treated TB patients[5].

The emergence of resistance to drugs used to treat tuberculosis, and particularly MDR-TB, has become a significant public health problem and an obstacle to effective TB control. Factors contributing to resistance are inadequate & incomplete treatment and poor patient compliance to treatment. The COVID-19 pandemic has just derailed the programmes creating a chaos.

Problem of incomplete treatment is due to long duration of treatment course, which is combated satisfactorily by DOTS program in India. The poor patient compliance is due to the adverse effects that the patient has to suffer at the whip of anti-TB drugs. This can only be resolved by proper counseling & guidance of the patient by the treating doctor.

The key element in adequate treatment of TB is acquiring knowledge about existing drug regimen[6].Along with it proper counseling of patients also plays a major role. The medical graduates in colleges are the future of healthcare workforce in a country. They should know the background of disease and in-depth knowledge about the treatment to successfully combat the disease. Hence the present study was undertaken to access KAP among the target population of Medical interns & postgraduates regarding MDR-TB in a tertiary care hospital.

MATERIALS & METHODS
It is a cross sectional study done by survey using a questionnaire, conducted in HKE Society's M R Medical College Kalaburagi. Study was conducted over a period of four monthsafter approval of protocol. The study was conducted in accordance to the protocol after written informed consent from study subjects.

PROCEDURE: Questionnaire was structured to obtain the socio-demographic and professional data of medical interns & postgraduates, evaluate their knowledge, attitude and practice regarding concept of MDR-TB. The structured & validated questionnaire was used. The questionnaire was divided in 3 parts to assess knowledge, attitude and practice separately. There were 10 questions assessing knowledge, which were allotted one point for correct response & thus total correct response was calculated. Questionnaire later had 5 questions related to attitude which was assessed by five point Likert scale. Those showing agreement & strongly agreement were considered as having positive attitude and those showing disagreement, strongly disagreement & undecided were considered having negative attitude. Five questions were evaluating the practices followed by the participants. Each correct response was given a score of 1. The total score is 20.

DATA COLLECTION: Questionnaire was distributed to 163 participants. Questionnaire was collected back after one hour of distribution.

STATISTICAL ANALYSIS: The data was analyzed question-wise and their mean & percentage value was calculated with the help of Microsoft Excel Spread sheet in MS office.

RESULTS
A total of 163 participants were approached personally. Only completely filled questionnaires were taken up for further analysis. The response rate was 92%. Out of 150 participants that were taken up for analysis 76 were interns & 74 postgraduates (PGs). Out of 74 PGs 31 were from surgical fields and rest 43 from medical fields. Majority participants were female and were representative of young India of age 20 to 35yrs (53%). The mean age of the participants was 28.07yrs. Demographic details and characteristic features are shown in the Table 1.

Table 1: Demographic details and characteristic features of participants

Demographic characteristics (n=150)	Number	%
Sex		
Male	56	37
Female	94	63
Age		
20-25	65	43
26-30	79	53
30-35	6	4
Professional Qualification		
Interns	76	51

Postgraduates Surgical (General Surgery, OBG, ENT) Medical (Medicine, Pediatrics, Dermatology)	31 43	49

In the present study the evaluation of knowledge was done by giving one point each for correct response and no points for wrong response or non-responders.

The average score for interns was 7.88 and for postgraduate was 9.08 out of a total score of 10. The mean of knowledge of the all participants was 84%.

Table 2: Evaluation of Knowledge

Sl. No.	Questions	Interns (n=76)		Postgraduates (n=74)	
		Correct	Incorrect	Correct	Incorrect
1.	Mention drugs resistant in MDR-TB	58 (76%)	18 (24%)	70 (94%)	4 (6%)
2.	Mention drugs resistant in XMDR-TB	61 (80%)	15 (20%)	70 (94%)	(6%)
3.	Do you know a case defaulter	65 (86%)	11 (14%)	67 (90%)	7 (10%)
4.	Do you know a case relapse	61 (80%)	15 (20%)	70 (94%)	4 (6%)
5.	Pulmonary TB is common type of TB presentation	76 (100%)	0 (0%)	74 (100%)	0 (0%)
6.	Patient with >3wks cough should undergo sputum examination	74 (98%)	2 (2%)	73 (98%)	1 (2%)
7.	Sputum culture is diagnostic	71 (94%)	5 (6%)	71 (96%)	3 (4%)
8.	There are 2 patient category while considering treatment regimen in TB	21 (28%)	55 (72%)	43 (58%)	31 (42%)
9.	Treatment duration for MDR-TB is > 2yrs	65 (86%)	11 (14%)	68 (92%)	6 (8%)
10.	TB is a notifiable disease	46 (60%)	30 (40%)	68 (92%)	6 (8%)

All the participant had adequate knowledge about the concept of MDR-TB with postgraduate students outnumbering the interns. Overall more than 85% of the participants (both interns and postgraduates) had sound knowledge about the terminologies of MDR-TB, XMDR-TB, case defaulter and case relapse. Almost 100% of the participants knew the common presentation, symptomatology and diagnostic methodology of tuberculosis. When enquired about the category of patients to be considered while treatment few participants could conclude that there were 2 categories as per the recent guidelines. Only 43% of the participants were aware of the 2 category of patients. Majority of them were postgraduate students (58%) whereas only 28% interns knew about it. 89% of the total participants knew that MDR-TB needs a prolonged duration of therapy extending to about 2 years. TB is a notifiable disease in India as per law. But only 60% of the interns and 92% of the postgraduates knew about the fact. It's difficult to imagine the success of any program or initiative if lesser stakeholders are aware of the same.

Table 3: Evaluation of Attitude

Sl. No.	Questions	Interns (n=76)		Postgraduates (n=74)	
		Positive	Negative	Positive	Negative
1.	Need for continuous up gradation about recent advances	59 (78%)	17 (22%)	68 (92%)	6 (8%)
2.	Standard treatment regimen given in guideline should be followed	64 (84%)	12 (16%)	70 (94%)	4 (6%)
3.	TB patients should be referred to nearest DOTS center	59 (78%)	17 (22%)	64 (86%)	10 (14%)
4.	Counseling of patients with ADR not to stop ATT	65 (86%)	11 (14%)	68 (92%)	6 (8%)
5.	Sputum examination should be done at govt. accredited DST lab	53 (70%)	23 (30%)	58 (78%)	16 (22%)

The mean score of attitudes of the all participants was 4.18 out of 5. The average score positive attitude for interns was 3.96 and for postgraduate was 4.41 out of a total score of 5. The mean of positive attitude of the all participants was 84%.

Overall 85% of the participants were of opinion that there was need for continuous upgradation about the recent updates and changes in regulations in guidelines for treating tuberculosis. 84% of interns and 94% of postgraduates were having positive attitude towards following standard treatment regimen as per guidelines laid down by the authority. 82% of participants would positively refer the patients to the nearest DOTS center. Among postgraduates 92% were showing inclination to counsel the patient with adverse drug events to not stop taking the treatment and explaining the importance and complication of drug resistance due to discontinuation of treatment. To avoid drug resistance its necessary to do a drug sensitivity testing before initiation of the treatment, but only 70% of interns and 78% of postgraduates were of opinion to send patient's sputum for drug sensitivity testing in government accredited laboratory.

Table 4: Evaluation of Practices

Sl. No.	Questions	Interns (n=76)		Postgraduates (n=74)	
		Positive	Negative	Positive	Negative
1.	Do you use mask while attending TB patient	52 (68%)	24 (32%)	55 (74%)	19 (26%)
2.	Do you educate patient about MDR TB and drug resistance	23 (30%)	53 (70%)	34 (46%)	40 (54%)
3.	Do you send sputum sample of resistance cases for Drug sensitivity Testing	24 (32%)	52 (68%)	34 (46%)	40 (54%)
4.	Do you own a personal copy of treatment guidelines	21 (28%)	55 (72%)	37 (50%)	37 (50%)
5.	Did you attend any workshop on TB	32 (42%)	44 (58%)	43 (58%)	31 (42%)

The mean score of practice of the all participants was 2.3 out of 5. The average score of correct practices for interns was 2 and for postgraduate was 2.7 out of a total score of 5. The mean of positive practices of the all participants was 46%.

Overall 71% of the participants were using the masks while attending a TB patient. Only 30% of interns and 46% of postgraduates were educating the patients about MDR-TB and drug resistance and its consequences. Mere 32% of interns were sending sputum sample for drug sensitivity testing. 28% of interns and 50% of postgraduates had a personal copy of treatment guidelines for reference. Out of 150 participants only 75 attended a workshop/seminar on TB recently.

DISCUSSION

Deficiency in knowledge among the medical graduates in any disease leads to substandard care, inefficient use of resources and a negative impact on health outcomes. Along with knowledge, the attitude of medical graduates towards disease will determine the amount and quality of care and information given to the patients during treatment. Knowledge deficits in MDR-TB leads to severe consequences of increasing the risk of TB transmission and development of resistance.

Inadequate or incomplete information passed on to the patients create wrong impression in them regarding the disease or strengthen the negative perspective of patients which are usually based on cultural beliefs and misconceptions; both of these outcomes are hazardous to the patient as well as community at large[6].

Most of the studies have shown knowledge lapses with regards to tuberculosis among the healthcare professionals[7].The participants in our study had sound knowledge about MDR TB but were unaware about recent updates in treatment guidelines especially interns.

A study inRussia showed lower score of knowledge among the healthcare professional. There was a significant difference in knowledge among physicians, nurses, lab staff and support staff, with physicians scoring significantly higher than others[8].Our study did not show significant difference in knowledge distribution among interns and postgraduates. The majority of lapse in knowledge was in the area of infection control in the study by Wendy Mann Woithet, whereas our study the major area of knowledge lapse was found in updatation regarding the newer treatment guidelines[8].

Study by Hashim DS *et al*., showed 95.5% of healthcare professionals had good knowledge which was significantly associated with age (36.4 ± 16.4) and job duration[9].Our study even though had participants with mean age of 28.07yrs but showed comparatively a better knowledge score of about 84%. Our finding are consistent with study by where most of the participants (89.2%) had appropriate knowledge of transmission, diagnosis and prevention of TB[10].In another study of TB among healthcare workers in Vellore District, Tamil Nadu, South India, 86% of them were knowledgeable about TB disease. In terms of transmission and symptoms of TB, 95% of them

correctly said that TB is transmitted via airborne route through coughing and sneezing [11].Among HCWs working with tuberculosis studies found that only 37.2% knew the definition of MDR-TB[12].In our study overall more than 85% of study participants knew the basic terminologies in MDR-TB.

All the cases of TB diagnosed by any means, at any place and by any healthcare professional must be reported to the public health authorities following a specified format[13]. TB has been declared as a notifiable disease in India since 2012. This initiative was brought into effect to estimate the number of TB cases prevailing in the community with greater accuracy and swiftly[14].Signaling the diagnosis of any disease entity does not invade the privacy of either the patient or the consulting physician. Instead it improves proper implementation of governmental facilities. China, with the second highest number of TB cases, has shown improvement in its TB estimates drastically since implementing a web-based system of mandatory case reporting in 2005[15, 16]. There may be many opinions to consider TB as a notifiable disease in different countries. But studies suggest that changes in public health guidelines to make TB a notifiable disease will have a positive impact on the regulation programs. The same is also suggested in a study by Lee, Yuri[17].Not only the TB disease be a notifiable entity but the assessment of drug resistance before initiation of treatment should also be notified to the authority, as recommended by Cowling *et al.*,[18].

The variations between the knowledge scores among different studies may be attributed to different techniques of conduct of study. The high level of good knowledge reported in some studies [10]may be due to high level of educational activities carried out by the government agencies, through mass media or other community activities which emphasizes the seriousness of the disease, its mode of transmission and compulsive need for adequate and complete treatment to avoid drug resistance and its sequelae.

ATTITUDE

Attitude, by meaning, reflects on how people feel about certain subjects or issues [19].Healthcare professionals attitude towards regimen adapted for TB are important factors in improving patient's health, compliance with prescribed treatment, outcome and finally to prevent the development of drug-resistance.

The study by Vukugah*et al.*, found that overall 44.4% of health care workers had a poor attitude towards pediatric TB management[20].This was due to the low proportion of trained and experienced working force providing TB services in the respective health facilities.

Our study had overall 84% of positive attitude mainly because the target population was more aware of the seriousness of the issue and hence showcased positive and constructive attitude towards prevention of increase in resistance.

85% of the participants, irrespective of the branches in which they were working, had a strong positive attitude towards the fact that regular upgradation of knowledge on TB should be procured.

92% of the overall participants showed positive attitude towards providing proper counselling to the patients to continue taking medications even after having adverse reaction. This is positive way helps to bring down the drop outs from the treatment. As per report the loss to follow-up to treatment was around 4% in newly diagnosed patients and a whopping 13% in patients suffering from drug resistant TB[21].Proper counselling and assurance from treating doctors plays vital role in treating MDR-TB where there are multiple drugs and more chances of reaction which may weaken the will power of patients to continue treatment for long period of time.

Drug resistance is mainly caused by genetic mutation of pathogen, pathological factors in patients that hamper adequate drug levels to act on pathogen. Implementation factors like an inadequate or poorly administered treatment regimen and compromised governmental TB services which may hinder detection and complete treatment of drug resistance. Ideally before initiation of therapy it is imperative to do drug sensitivity testing, but study revealed that only 70% of interns and 78% of postgraduates were of opinion to send patient's sputum for drug sensitivity testing in government accredited laboratory. This may adversely impact patient outcome.

PRACTICE

All the knowledge and positive attitude towards preventing development of drug resistance in TB will be of no use if these are not brought out in day-to-day practice. World Health Organization defines practice as how people behave [19].Practice reflects the ability of an individual to apply the knowledge he/she has gained in any direction intended.

Our study had only 42% overall positive practice by participants. This reading is little discouraging when compared to study by Alotaibi et where over 62% of the health professionals were deemed to have good overall practice scores[22].The CDC guidelines proposed the implementation of infection prevention control measures at three levels in a healthcare facility: administrative, environmental and personal respiratory protection[23].Out of it the personal protection is under the control of individual healthcare professionals. The government initiative of end-TB strategy not only depends on pathophysiology and chemotherapy knowledge, but also on a positively motivated doctor with good attitudes towards infection prevention and control.

In our study overall only 71% of the participants were using the masks while attending a TB patient, which may seriously increase the risk of transmission among healthcare providers and subsequently the community at large. This finding is better when compared with study by Biscotto *et al.*, where around 40% used the

masks while attending patients[24].The low percentage of participants using the protective gears may be due to administrative and financial constraints also, but this number has to increase so as to break the chain of transmission that threatens future generations.

The poor practices in our study primarily was concerning with diagnosing TB and counselling the patients with regards to continuing the full course of treatment irrespective of adverse reactions. More efforts are to be taken to encourage young doctors to connect with patients and educate them about MDR-TB and drug resistance along with its adverse consequences to personal and family health, financial burdens and risk to the community at large. Scores in practice component showed significant differences in interns and postgraduates with the later having better scores in all questionaries. This depicts that as the level of education and experience increases the scores also increases. This finding is in line with a study done by Noe A *et al.*, who found a significant association between practice scores among health workers and level of education and experience[25].

Overall 50% of the participants in our study attended some workshop/conference related to TB. This score is low as there will be many updates in treatment guidelines and government regulations that a treating doctor should be aware of. Study by Nicol*et al.*,[26]suggests that training for healthcare workers could reduce the likelihood of spread and infection of tuberculosis. Not only training is crucial factor to augment the knowledge base of the doctors but also to motivate them towards positive attitude and practice accordingly.

This study had few limitations, only small group of interns and postgraduates in one site were included in the study. Participant were not personally monitored while filling the questionnaire this may effect the individual scores. A multistage study may add to our insight so as to take necessary action on a larger scale so as to create an impact.

CONCLUSION

Preventing drug resistance among tubercular patients is a humongous task which involves many stakeholders from government to people working at the grassroot level. An important link in this chain of command are the treating doctors. As the disease is still prevalent it may take few generations to bring it under control. Hence the young doctors right now would be playing a vital role in future in this regards. Helping them gain knowledge, positive attitude will bring out fruitful outcome in terms of their practice. Isoniazid & Rifampicin are the cornerstone in management of TB. But treatment failure may occur due to development of resistance. Hence secondline drugs will have to be used which are less effective & more toxic. Thus MDR-TB requires prolonged treatment.

Our survey revealed that the attitude of most of the participants was positive towards handling a MDR-TB cases. Few participants were either not aware or did not adhere to standard practices. The study emphasized need for continuous educational interventions necessary to upgrade their understanding, recent knowledge, as well as change their attitude towards patients. The study also revealed that there was significant difference in practice followed by Interns and PGs. This enunciates that there should be proper training during initial years of education so that good practices are imbibed in young budding doctors.

Our study emphasizes that training although repeated are necessary component in combating the drug resistance in TB. Although newer techniques of diagnosis like GeneXpert MTB/RIF and newer drugs like Bedaquiline have hit the market, if used without proper training even these hopes of mankind that have blossomed after many decades may fade away. Hence there should be proper training exercises with in-hand experience for the doctors to be confident in facing the century old rival of the mankind.

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