RESEARCH ARTICLE

DELAY IN INITIATING MDR-TB TREATMENT LEADS TO INCREASE IN PREVALENCE OF PULMONARY TB CASES IN HOUSEHOLD CONTACTS OF MDR-TB CASES IN WARDHA DISTRICT, MAHARASHTRA, INDIA

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ABSTRACT

Introduction: Close contacts of MDR-TB patients are expected to be at increased risk of developing TB. Therefore, when patients are diagnosed with MDR tuberculosis, early initiation of treatment is a particularly important element of prevention for developing new cases of active tuberculosis in the community.

Methodology: We conducted domiciliary visits to interview index cases as well as their household contacts. This study was a community based cross sectional study conducted in between June 2012 to December 2012 for all those house hold contacts in all 08 blocks of Wardha District, Maharashtra, India.

Result: Out of 259 close contacts of 84 index MDR-TB patients, 06 (2.31%) had active tuberculosis. 66.68% cases found sputum positive chest symptomatic household contact when duration of delay was 16 to 30 days for starting treatment after diagnosis of MDR-TB in index case followed by 16.66% each when delay was more than 30 days.

Conclusion: An early identification and early initiation of treatment in potential cases will eventually translate into reduced morbidity, mortality and transmission of infection in the community.

INTRODUCTION

"Tuberculosis (TB) persists as a global public health problem of serious magnitude requiring urgent attention. The public health dimension concerns proper diagnosis and treatment of patients with TB to decrease disease transmission. The emergence of resistance to drugs used to treat TB, and particularly Multi Drug-Resistant TB (MDR-TB), has become a significant public health problem and an obstacle to effective TB control. (Singla *et al*., 2011) While earlier diagnosis of MDR–TB required clinical and laboratory improvements, preventing ongoing spread of drug–resistant strains in the community also is a critical TB control concern. Several studies have found that close contacts of MDR–TB patients have very high rates of TB. (WHO 2006; Kritski *et al*., 1996; Schaaf *et al*., 2000; Teixeira *et al*., 2001; Schaaf *et al*., 2002; Bayona *et al*., 2003) At present, contact tracing is recommended by WHO for all close contacts of MDR–TB cases; however, whether this practice actually occurs systematically in endemic countries is questionable due to limited resources and high case burden. With MDR–TB, case

detection needs to be actively shortened in order to improve delays in diagnosis as well as initiation of treatment and in order to reduce the length of the infectious period during which a case is likely to propagate the drug–resistant strain. The purpose of contact investigation is to promptly identify and treat individuals with active or latent tuberculosis, stop further transmission, and prevent new cases of active tuberculosis. Several studies have found that close contacts of MDR TB patients have very high rates of TB (WHO, 2006; Kritskim *et al*., 1996; Schaaf *et al*., 2000; Teixeira *et al*., 2001; Schaaf *et al*., 2002; Bayona *et al*., 2003). In Wardha district, there is 84 cases of diagnosed MDR-TB as per report of District Tuberculosis Office (DTO), Wardha in June 2012. Since the contacts are of high risk of developing TB, therefore contact screening is an essential for effective tuberculosis control. Literature search showed that there was no study conducted on effect of delay in initiation of treatment of MDR-TB cases over household contacts of MDR-TB cases in Wardha district, hence this study was undertaken.

MATERIALS AND METHODS

This study was an observational community based cross sectional study for all house hold contacts. This study was

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carried out in all 08 blocks of Wardha District, Maharashtra, India for half year (from June 2012 to Dec 2012)

Study participants: All the household contacts (all ages and both sexes) of registered MDR-TB patients at District Tuberculosis Centre, Wardha.

Sample Size: This study included all known MDR-TB patients (84) registered at District TB centre (DTC) and their household contacts.

Sample selection method

A list of MDR-TB patients registered at District Tuberculosis centre, Wardha was obtained with their detail addresses & contact number. The investigator contacted through home visit & screened every household contact of MDR-TB patients for presence or absence of Tuberculosis as per RNTCP guidelines. All chest symptomatic household contact was asked to provide two sputum specimens (1st spot & 2nd early morning) for microscopy were brought at nearby DMC where index case resides for sputum microscopy as soon as possible. Close contacts of MDR-TB patients who were found smear positive PTB, started on Category I in collaboration with DTO Wardha.

Data collection tools

A pretested & predesigned data collection tool was use to collect the data from head of family, index case (MDR-TB) and chest symptomatic through interview technique and those who had chest symptoms were interviewed separately on separate questionnaire.

Data analysis

Data thus collected was analysed using software Systat 12.0 version, descriptive analysis was done by using mean, SD and analytical analysis using chi square, Anova, z-test, unpaired t test. The significance level was considered at $p < 0.05$.

Ethical consideration: Study was conducted after due written permission from the District Tuberculosis Officer (DTO) Wardha.

RESULTS

Table I revealed that nearly 37% patients started the treatment within 16 to 30 days after diagnosis of MDR-TB followed by 23.80% within 15 days from diagnosis then 31 to 45 days (17.86%) and 46 to 60 days (09.52%).

Table I. Distribution of MDR-TB patients according to interval between diagnosis of MDR-TB and starting treatment

Duration (days) between diagnosis of MDR-TB and starting treatment.	MDR-TB patient	
	No	%
Less than 15 days	20	23.80
16 to 30 days	31	36.90
31 to 45 days	15	17.86
46 to 60 days	08	09.52
61 to 75 days	04	04.77
76 to 90 days	01	01.19
More than 91 days	03	03.58
Treatment not started	02	02.38
Total	84	100.00

Remaining (11.90%) started after 02 month of diagnosis. Overall 60.70% cases started treatment less than one month duration and 37% started after one month, 2.38% patient did not started treatment as they were non traceable after diagnosis. It also revealed that nearly 10% of patients did not started treatment even after 60 days of diagnosis.

Table II. Distribution of Sputum Positive Cases among chest symptomatic contacts

Sex	Number of MDR-TB cases	Total Household contacts	Chest symptomatic	Sputum positive cases	
Male	63(75%)	118 (45.56%)	07 (53.85%)	04 (66.67%)	Z= 0.715
Female	21(25%)	141 (54.44%)	06 (46.15%)	02 (33.34%)	P= 0.475
Total	84(100%)	259 (100.00%)	13 (100.00%)	06 (100.00%)	

Table II indicates that prevalence of chest symptomatic among household contacts was (13/259) 05.02%. Prevalence of active TB cases (sputum positive) was 02.31%. Sputum positivity among chest symptomatic was (06/13) 46.15% which included 66.67% males and 33.33% females. By applying z proportion test, it was found that there is no significance difference in male and female sputum positive cases among household contacts and chest symptomatic (p value >0.05).

Table III. Relationship between delay in starting treatment of MDR-TB index cases and sputum positive contacts

Duration of delay in initiation of treatment of MDR-TB index cases	Number of sputum positive cases among chest symptomatic Household contacts	
	No	%
<15 days	00	00.00
16 to 30 days	04	66.68
>30 days	01	16.66
Treatment not started	01	16.66
Total	06	100.00

Table III revealed that 66.68% cases found sputum positive chest symptomatic household contact when duration of delay was 16 to 30 days for starting treatment after diagnosis of MDR-TB in index case followed by 16.66% each when delay was more than 30 days and treatment not started at that time after diagnosis. There was no sputum positive contact found among chest symptomatic when related index cases started treatment within 15 days after diagnosis of MDR-TB.

DISCUSSION

The current study revealed that only 23.80% cases initiated treatment within 15 days from diagnosis of MDR-TB. Delay of 16 to 30 days for initiation of treatment found in 36.90% cases. Cheng *et al.* (2013) reported that delay of 14 to 29 days in 54.5% cases and 55.5% cases delayed between 30 to 59 days for the initiation of treatment. Granjean *et al.* (2011) reported that 50% cases did not receive adequate treatment for >230 days after initial diagnosis of MDR-TB and he defined infectious period as the time from index case TB diagnosis to initiation of appropriate treatment. These finding of delay in starting treatment was differ than our study. Prevalence of sputum positive cases among household contacts was 2.31% and chest symptomatic 46.15% in present study. Nearly two third were males and one third females. Our findings were in accordance with Becerra *et al* (2.60%), Attamna *et al* (2.52%),

Snider *et al* (1.7%), Gregory *et al* (3.1%). Singla *et al.* (2011) reported a figure of 05.29% sputum positive cases, which was differs from our study. Studies conducted by Kritski *et al*, Texeiria *et al*, Bayona *et al*, Elizabeth clara *et al*, Grandjean *et al*, Vella *et al*, Shah *et al* reported sputum positive active TB among household contacts were 08%, 04%, 08%, 4.49%, 05%, 04%, 7.8% respectively. (Kritski *et al.*, 1996; Teixeira *et al.*, 2001; Bayona *et al.*, 2003; Elizabeth Clara Barroso *et al.*, 2004; Grandjean *et al.*, 2011; Vella *et al.*, 2011; Shah and Courtney m yuen, 2013) In present study, there is positive correlation/association of delay in starting treatment of MDR-TB index case and sputum positive household contacts. Similar observation were also made by Cheng *et al.* (2013) All 06 smear positive Pulmonary Tuberculosis patients were put on Category I regimen in collaboration with DTO Wardha under RNTCP and those 07 Chest symptomatic smear negative were treated with antibiotics and supportive care and monitored as per RNTCP Guidelines.

Conclusion

There was a huge delay in initiation of treatment of MDR-TB cases. More in delay leads more prevalence of sputum positive pulmonary TB cases in household contacts. Regular monitoring and follow up of household contact helped early identification of suspected chest symptomatic and also active TB cases. It was also noticed that chest symptomatic did not informed to health agency/care provider for their symptoms in initial period of disease. An early identification and early initiation of treatment in potential cases will eventually translate into reduced morbidity, mortality and transmission of infection in the community.

REFERENCES

Attamna A, Chemtob D, Attamna S, Fraser A. and Rorman E, 2009. Risk of tuberculosis in close contacts of patients with multidrug resistant tuberculosis: a nationwide cohort. Thorax, (3): 271.

Bayona J, Chavez-Pachas A M, Palacios E, Llaro K, Sapag R. and Becerra M C. 2003. Contact investigations as a means of detection and timely treatment of persons with infectious multidrug-resistant tuberculosis. *Int J Tuber Lung Dis.*, 7(12): 501–509.

Becerra M C, Appleton S C, Franke M F, Chalco K, Fernando A, Bayona J, Murray M, Sidney S Atwood and Carole D Mitnick. 2011. Tuberculosis burden in households of patients with multidrug-resistant and extensively drug-resistant tuberculosis: a retrospective cohort study. *Lancet*, 377 (9760): 147-152.

Cheng S, Chen W, Yang Y, Chu P. and Liu X. 2013. Effect of Diagnostic and Treatment Delay on the Risk of Tuberculosis Transmission in Shenzhen, China: An Observational Cohort Study, 8(6):1371

Elizabeth Clara Barroso, Rosa M Salani Mota, Valéria Góes Ferreira Pinheiro, Creusa Lima Campelo and Jorge Luis

Nobre Rodrigues, 2004. Occurrence of active tuberculosis in households inhabited by patients with susceptible and multidrug-resistant tuberculosis. *J. Bras. Pneumol.*, 30 (4): 11-12. Available at www.ubcmj.com.

Grandjean L, Crossa A, Gilman RH, Herrera C. and Bonilla C. 2011. Tuberculosis in household contacts of multidrug-resistant tuberculosis patients. *Int J Lung Dis.*, 15(9): 1164–1269.

Gregory J. Fox, Simone E. Barry, Warwick J Britton and Guy B. Marks, 2012. Contact investigation for tuberculosis: a systematic review and meta-analysis. *ERJ Express*, doi: 10.1183/09031936.00070812.

Kritski A L, Marques M J, Rabahi M F, Vieira M A, Werneck-Barroso E, Carvalho C E, Andrade G de N, Bravo-de-Souza R, Andrade L M, Gontijo P P. and Riley L W. 1996. Transmission of tuberculosis to close contacts of patients with multidrug-resistant tuberculosis. *American Journal of Respiratory and Critical Care Medicine*, 153(1): 331-335.

Schaaf HS, Gie RP, Kennedy M, Beyers N. and Hesseling PB. 2002. Evaluation of young children in contact with adult multidrug-resistant pulmonary tuberculosis: a 30-month follow-up. *Pediatrics*, 109(5): 765–771.

Schaaf HS, Van Rie A, Gie RP, Beyers N, Victor TC, Van Helden PD and Donald PR. 2000. Transmission of multidrug–resistant tuberculosis. *Pediatric Infectious Disease Journal*, 19(8):695-699.

Shah N S. 2013. Courtney m yuen. Yield of Contact Investigations in Households of Drug-Resistant Tuberculosis Patients: Systematic Review and Meta-Analysis. Albert Einstein College of Medicine and Montefiore Medical Center, Bronx, New York (USA). *Clinical Infectious Diseases*, DOI: 10.1093/cid/cit643.

Singla N, Singla R, Jain G, Hbib. L and Behera D. 2011. Tuberculosis among household contacts of multidrug resistant tuberculosis patients in Delhi, India. *Int J Tuber Lung Dis.*, 15(10):1326-1330.

Snider D E Jr, Kelly G D, Cauthen G M, Thompson N J and Kilburn J O. 1985. Infection and disease among contacts of tuberculosis cases with drug-resistant and drug-susceptible bacilli. *Am Rev Respir Dis.*, 132: 125–132.

Teixeira L, Perkins M D, Johnson L J, Keller R, Palaci M, V. do Valle Dettoni**,** L. M. Canedo Rocha, S. Debanne, E. Talbot and R. Dietze, 2001. Infection and disease among household contacts of patients with multidrug-resistant tuberculosis. *Int J Tuber Lung Dis.*, 5(4):321–328.

Vella v, Racalbuto v, Guerra R, Marrac, Gandhi N R. and Shah N S. 2011. Household contact investigation of multidrug resistant and extremely drug resistant tuberculosis in a high HIV prevalence setting. Kwazulu natal- South Africa. *Int J Tuberc Lung Dis.*, 15(9):1170-75.

World Health Organization. Guidelines for the programmatic management of drug resistant Tuberculosis. Geneva, WHO 2006.WHO/htm/TB/2006.361

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