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Research Article

Patient and health system delay among new pulmonary tuberculosis patients diagnosed at medical college hospitals in Puducherry, India

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ABSTRACT

Background: Early diagnosis of the disease and prompt initiation of treatment are essential for an effective tuberculosis (TB) control program. The delay in the diagnosis and treatment may worsen the disease, increases the risk of death and enhances tuberculosis transmission in the community. This study was done to assess the extent of various delays and their determinants among TB patients.
Methods: A cross-sectional study including retrospective medical record review and patient interviews was conducted during the year 2010 in and around union territory of Puducherry in India. A structured questionnaire used in the WHO multi-country study to estimate the diagnostic and treatment delay in TB was used to interview the patients. Average estimates and proportions were calculated for continuous and categorical variables respectively. Unadjusted odds ratios (OR) were calculated. Level of significance was determined at 95% confidence level (P value <0.05) and all tests applied were two-sided.
Results: A total of 138 new sputum smear positive TB patients were included in the study. The mean age of participants was 41.8 years ± 17.3 years (range 15-87 years). Majority (67.4%) of the patients were male and married (68.8%). Majority (86%) of the patients were literate. The median patient delay, health system delay and total delay was 36 days, 28.5 days and 81 days respectively. The place of residence (OR = 0.39, 95% CI = 0.18-0.87) and family size (OR = 0.45, 95% CI = 0.21-0.97) were found as the determinants of various delays for TB patients.
Conclusion: Patient and health care system delay for TB patients is long. There is need to improve the referral mechanism to ensure an early initiation of treatment for TB patients diagnosed a tertiary care hospitals.

Keywords: Tuberculosis, Patient delay, Health system delay, India

INTRODUCTION

Early diagnosis of the disease and prompt initiation of treatment are essential for an effective tuberculosis (TB) control program.[1] Globally, with an estimated TB incidence of 176 per 100000 population in the year 2012, India ranks first among the high burden countries. Despite achieving the targets of case finding of 70% and treatment completion rate of over 85%, TB remains an important public health issue.[2] Like any other illness, private and informal Health Care Providers (HCPs) are often the first source of care for TB patients and these

patients moves from one HCP to another before they are finally diagnosed and started on anti-tuberculosis treatment.[3] Studies suggested that the diagnosis of TB is often delayed, and one major reason is repeated visits at the same health care level and non-specific antibiotic therapies.[4,5] The delay in the diagnosis may worsen the disease, increases the risk of death and enhance tuberculosis transmission in the community.[6]

Further understanding the causes for delay in diagnosis and treatment is essential for TB control.[7] Many factors have been identified as influencing delay in diagnosis and start of treatment including the individual's perception of disease, socioeconomic level, stigma, extent of awareness about disease, severity of the disease, distance between the patient's residence and health services and expertise of health personnel.[8] Such reasons for overall delay have been attributed to both patients and health system.[9]

Since the involvement of medical colleges in Revised National Tuberculosis Control Programme (RNTCP), a large number of patients are diagnosed at medical college hospitals. Most of these TB patients diagnosed at medical colleges are referred for treatment and these results in more health system delay.[10]

As no study regarding patient and health system delay for TB cases diagnosed at the medical colleges was found, this study will be important in giving information regarding the various delays among these patients. Also, it is important to assess whether TB patients are diagnosed and initiated on treatment with minimum delay so that the desirable epidemiological impact on the disease can be made. Therefore, this study was done to assess the extent of delay in the diagnosis and treatment of tuberculosis patients.

METHODS

Study design and study setting

A community based descriptive study was conducted during the year 2010 in and around the union territory of Puducherry in India. With a population of 1.2 million and four small unconnected districts, the union territory of Puducherry has nine medical colleges.[11] Apart from Puducherry, a large number of TB suspects are visiting the medical colleges from surrounding districts of Tamil Nadu state. All TB patients diagnosed by sputum smear microscopy at the medical college hospitals are registered and started on treatment or referred to nearest health facility for anti-tuberculosis treatment. At the time of study, only four medical colleges were having RNTCP designated microscopy centre (DMC).

Sample size calculation

A sample size of 282 was calculated. (Taking a precision of 5%, 30-40% prevalence of delay for more than 30 days and 95% confidence level)

Study population and sampling

A total of 482 new adult pulmonary sputum positive tuberculosis patients diagnosed at the DMCs of four selected medical colleges during year 2009 were enlisted. From the list, 282 study participants were selected randomly. The enlisting and recruitment of participants was done on quarterly basis to interview the selected patients at the earliest after diagnosis. As these patients were started on treatment or referred to other health facilities nearest to their residence, their details were cross-checked with the referral register and treatment cards maintained at the district tuberculosis centre.

Data collection

A structured questionnaire used in the WHO multi-country study to estimate the diagnostic and treatment delay in TB was used to interview the patients.[11] The study questionnaire was translated in the local language and was pilot-tested. The questionnaire included information on socio-demographic profile, major presenting symptoms, duration of major presenting symptoms and the date of first visit to a health facility, reasons for delay if any and amount of money spent during and after diagnosis.

The selected study participants were contacted at their home and written informed consent was obtained. All the participants were interviewed by trained field staff and the required information was collected. The duration of symptoms, date of diagnosis and date of starting treatment were cross-checked from the available RNTCP records. Those patients who could not be contacted during first visit were visited again.

Operational definitions[11]

The total delay is the time interval from the onset of symptoms to the initiation of anti-tuberculosis drugs. It is the sum of patient and healthcare system delay since it can be attributed to both these types of delay which are defined as follows:

- Patient delay: Time interval between onset of symptom and presentation to a health care provider.
- Health care system delay: Time interval between the date of health-seeking behaviour at a health care provider and the initiation of anti-tuberculosis treatment.

Total delay can be also attributed to the delay in diagnosis and in initiation of anti-tuberculosis treatment.

- Diagnosis delay: time interval between onset of symptom and tuberculosis diagnosis.
- Treatment delay: time interval between tuberculosis diagnosis and initiation of anti-tuberculosis drugs.

Ethical considerations

Study protocol was approved by the Institute Ethics Committee (IEC) of Pondicherry Institute of Medical Science, Puducherry. The permission for the conduct of this study was also taken from the department of health, government of Puducherry.

Data entry and analysis

All the data was entered in excel spreadsheet 2010 and data analysis was done by using the statistical packages SPSS for Windows version 16. Summary output tables of frequency, mean and standard deviation, median, minimum and maximum, etc. were produced. In some studies, experts agreed 30 days as acceptable cut-off for delay[12,13] whereas others used median value of the observed data as a cut-off [8,14,15] and we adopted the later to dichotomize data into delayed and not delayed. A multivariate regression analysis was performed to adjust for the confounding effect of several identified determinants of patient and health system delay of TB patients (Table 3). For the logistic regression modelling the outcome variables were patient delay, health system delay and total delay. Unadjusted Odds Ratios (OR) were calculated and significance was determined at 95% confidence level (P value <0.05).

RESULTS

Among 282 selected participants, the address was incomplete for 71 (25.2%) participants so only 211 (74.8%) study participants were visited. Among 211 TB patients visited, 38 (18.0%) could not be traced due to wrong address, 27 (12.8%) expired due to TB and other causes, 6 (2.8%) migrated and 2 (0.9%) refused to participate in the study.

Socio-demographic characteristics

A total of 138 new sputum smear positive TB patients were included in the study. The mean age of participants was 41.8 years ± 17.3 years (range 15-87 years). Majority (67.4%) of the patients were male and married (68.8%) and approximately one-fourth (24.6%) were in the age group of 15-24 years. Majority (86%) of the patients were literate, and a larger population of patients (67.3%) were from Tamil Nadu state. In majority of the cases (78.3%), the family size was ≥5. About 37% patients were earning ≤Rs. 2000 per month and another 37% did not have a steady source of income. Among TB patients 8% and 10% were smokers and alcohol user respectively.

Delay in diagnosis & treatment of tuberculosis patients

After the onset of symptoms, patients consulted the health care provider (patient delay) after a median duration of 36 days (range 12-351 days). The median duration between the first consultation and initiation of treatment (health system delay) was 28.5 days (range 4-518 days). Median duration between onset of symptoms and initiation of anti-TB drugs (total delay) was 81 days (range: 25-548 days). This included a median diagnostic delay of 67.5 days (range: 18-431 days) and treatment delay of 10 day (2-463 days) (Table 2).

Table 1: Socio-demographic characteristic of tuberculosis patients (n=138).

Characteristic	Frequency	%
Age (years)		
15-24	34	24.6
25-34	18	13.0
35-44	25	18.1
45-54	22	15.9
55-64	24	17.4
≥65	15	10.9
Sex		
Female	45	32.6
Male	93	67.4
Education		
Illiterate	24	17.4
Primary	31	22.5
Middle	25	18.1
Secondary	25	18.1
Higher secondary and above	33	23.9
Occupation		
Farmer	30	21.7
Labourer	47	34.1
Homemaker	15	10.9
Govt. service	07	5.1
Private service	06	4.3
Others	33	23.9
Monthly personal income (INR)		
≤2000	51	37.0
2001-3000	15	10.9
3001-4000	8	5.7
4001-5000	4	2.9
>5000	9	6.5
Marital status		
Unmarried	40	28.9
Married	95	68.8
Widow	03	2.2
Family size		
≤5	108	78.3
>5	30	21.7
Residence		
Puducherry	45	32.6
Tamil Nadu	93	67.4
Smoking		
Yes	11	8.0
No	127	92.0
Alcohol consumption		
Yes	15	10.9
No	123	89.1
Total	138	100

Table 2: Different types of delay for tuberculosis patients in the community and health care facilities.

Various delays	Days		
	Mean ± SD	Median	Range
Patient delay	53.0 ± 46.2	36	12-351
Health system delay	56.0 ± 80.6	28.5	4-518
Diagnostic delay	88.5 ± 76.4	67.5	18-431
Treatment delay	19.9 ± 46.9	10	2-463
Total delay	109 ± 90.5	81	25-548

Factors associated with various delays

The total delay was lesser among resident of Puducherry as compared to Tamil Nadu (OR = 0.39, 95% CI = 0.18-0.87). Also patient delay was lesser in patients living in families with size of less than five (OR = 0.45, 95% CI = 0.21-0.97). Patients in younger age group seems to have a shorter delay, but this difference was statistically non-significant (OR = 0.49, 95% CI = 0.19-1.24). Similarly, there was no statistically significant difference with sex, education status, occupation and income of patients.

Table 3: Logistic regression analysis of risk factors for various delays.

Factors			Patient delay	System delay	Total delay
	N	(%)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (years)					
<45	77	55.8	0.95 (0.36-2.45)	1.31 (0.52-3.26)	0.49 (0.19-1.24)
45 and above®	61	44.2	1.0	1.0	1.0
Sex					
Female	45	32.6	1.64 (0.59-4.52)	0.39 (0.14-1.08)	1.262 (0.46-3.44)
Male®	93	67.4	1.0	1.0	1.0
Education					
Less than primary level	55	39.9	1.43 (0.63-3.25)	0.497 (0.22-1.11)	1.21 (0.54-2.69)
Primary level and above®	83	60.1	1.0	1.0	1.0
Occupation					
Peasant	77	55.8	1.14 (0.48-2.69)	0.75 (0.32-1.75)	0.94 (0.41-2.19)
Housewife	15	10.9	0.57 (0.14-2.27)	1.51 (0.39-5.71)	0.46 (0.11-1.89)
Others®	46	33.3	1.0	1.0	1.0
Personal income (monthly INR)					
≤ 2000	103	74.6	0.81 (0.33-1.97)	0.88 (0.38-2.08)	0.62 (0.26-1.45)
> 2000®	35	25.4	1.0	1.0	1.0
Marital status					
Single	43	31.2	0.81 (0.31-2.09)	0.669 (0.26-1.69)	1.01 (0.40-2.56)
Married®	95	68.8	1.0	1.0	1.0
Family size					
< 5	63	45.7	0.45 (0.20-0.97)*	0.93 (0.43-1.99)	1.23 (0.57-2.67)
≥ 5®	75	54.3	1.0	1.0	1.0
Residence					
Puducherry	45	32.6	0.49 (0.22-1.11)	0.87 (0.40-1.89)	0.39 (0.18-0.87)*
Tamil Nadu®	93	67.4	1.0	1.0	1.0

®Reference category; *P <0.05; OR - odds ratio; CI - confidence interval

DISCUSSION

As medical colleges are contributing to RNTCP significantly, the assessment of various delays among patients diagnosed at medical colleges is important for prevention and control of tuberculosis. Several studies have estimated various delays among TB patients in India. The magnitude of total, patient and health system delays ranged between 60-62 days, 6-23 days and 9-34 days respectively.[16,21,22]

In the present study, the median patients' delay was 36 days. This delay is similar to other community based studies done in South India[16-18] but some studies done in Maharashtra shows median patient delay of 47-95 days.[19,20] The possible reason for more delay in these studies could be that these studies were done in rural areas and our study was dominantly includes urban population. Urban studies done shows a median delay of as short as 6 days.[21] This reflects that the patient delay is more among TB patients residing in rural areas and could

be due to lower literacy rate and low awareness among rural population regarding TB.

In the present study median health system delay was 28.5 days. Similar study done in Bangalore showed a median health system delay of 18 days but the study setting among two studies varies.[18] Same study shows total delay of 41 days and in the present study median total delay was 81 days as present study includes participants from tertiary care hospitals only.[18] This study reported the unacceptably long delay duration between onsets of symptoms till treatment with anti-tuberculosis drugs. This delays ranges one month to more than one year, during that period the patients would be transmitting infection in the community.

There are obvious limitations in this study. The study relied entirely on responses as given by respondents and only hope for objective and honest responses. For instance, we were unable to determine the time of onset of symptoms in all patients in the study. Although the time of diagnosis and start of treatment was confirmed from the reports, the time of onset of symptoms suggestive of tuberculosis was reported by the patients themselves, there is a possibility of recall bias. Information depended on self-reports based on recall history and individual variations in perception of disease. We, however, limited participants to recently diagnosed cases to minimize recall bias. Moreover, questionnaires were pretested to make sure that all questions were understandable. The findings of the study cannot be generalized to the patients diagnosed and treated at various peripheral health institutions as these facilities are near to the residence of the patients and the probable delay is expected to be lesser than observed among patients diagnosed at the medical colleges. We followed the STROBE guidelines for reporting observational studies.[23]

CONCLUSION

Our study showed that delay among patients in seeking care is long and usually patients coming from far places are having more delay. Public health education targeting the identified groups is required to reduce the patient delay in accessing health care services.

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REFERENCES

1. World Health Organization. Global tuberculosis report, 2012. In: WHO, eds. WHO Report. WHO/HTM/TB/2012.6. Geneva, Switzerland: WHO; 2012.
2. World Health Organization. Global tuberculosis report, 2014. WHO, eds. WHO Report. WHO/HTM/TB/2012.6. Geneva, Switzerland: WHO; 2014.
3. Hazarika I. Role of private sector in providing tuberculosis care: evidence from a population-based survey in India. J Glob Infect Dis. 2011;3(1):19.
4. Sreeramareddy C, Panduru K, Menten J, Van den Ende J. Time delays in diagnosis of pulmonary tuberculosis: a systematic review of literature. BMC Infect Dis. 2009;9:91.
5. Storla DG, Yimer S, Bjune GA. A systematic review of delay in the diagnosis and treatment of tuberculosis. BMC Public Health. 2008;8:15.
6. Toman K. Tuberculosis case finding and chemotherapy questions and answers. In: Toman K, eds. WHO Case. Geneva: WHO; 1979.
7. Pantoja A, Floyd K, Unnikrishnan KP, Jitendra R, Padma MR, Lal SS, et al. Economic evaluation of public-private mix for tuberculosis care and control, India. Part I. Socio-economic profile and costs among tuberculosis patients. Int J Tuberc Lung Dis. 2009;13:698-704.
8. Suganthi P, Chadha VK, Ahmed J, Umadevi G, Kumar P, Srivastava R, et al. Health seeking and knowledge about tuberculosis among persons with pulmonary symptoms and tuberculosis cases in Bangalore slums. Int J Tuberc Lung Dis. 2008;12:1268-73.
9. Yimer S, Bjune G, Alene G. Diagnostic and treatment delay among pulmonary tuberculosis patients in Ethiopia: a cross-sectional study. BMC Infect Dis. 2005;5:112.
10. Sharma SK, Mohan A, Chauhan LS, Narain JP, Behera D, Kumar A, et al. Contribution of medical colleges to tuberculosis control in India under the Revised National Tuberculosis Control Programme (RNTCP): lessons learnt & challenges ahead. Indian J Med Res. 2013;137:283-94.
11. World Health Organization regional office for Eastern Mediterranean. Diagnostic and treatment delay in tuberculosis, 2006. Available at: http://applications.emro.who.int/dsaf/dsa710.pdf. Accessed 24 September 2012.
12. Wandwalo ER, Morkve O. Delay in tuberculosis case-finding and treatment in Mwanza, Tanzania. Int J Tuberc Lung Dis. 2000;4(2):133-8.
13. Pirkis JE, Speed BR, Yung AP, Dunt DR, Maclntyre CR, Plant AJ. Timeto initiation of anti-tuberculosis treatment. Tuber Lung Dis. 1996,77(5):401-6.
14. Abdi G, Bjune G, Fekadu A. Pastoralism and delay in diagnosis of TB inEthiopia. BMC Public Health. 2009;9:5.

15. Bassili A, Seita A, Baghdadi S, AlAbsi A, Abdilai I, Agboatwalla M, et al. Diagnostic and treatment delay in tuberculosis in 7 countries of the Eastern Mediterranean region. Infect Dis Clin Pract. 2008;16(1):23.
16. SelvamJerard M, Wares F, Perumal M, Gopi PG, Sudha G, Chandrasekaran V, et al. Health-seeking behaviour of new smear-positive TB patients under a DOTS programme in Tamil Nadu, India, 2003. Int J Tuberc Lung Dis. 2007;11:161-7.
17. Goel K, Kondagunta N, JoyceeSoans S, Ramachandra Bairy A, Goel P. Reasons for patient delays and health system delays for tuberculosis in South India. Indian J Community Health. 2012;23:87-9.
18. Jagadish SD, Saraswathi S, Divakar SV. A study of impact of determinants of patients and health system delay on tuberculosis diagnosis and treatment in Bangalore. Indian J Community Health. 2012;24:319-24.
19. Dhanvij P, Joshi R, Kalantri S. Delay in diagnosis of tuberculosis in patient's presenting to a tertiary care hospital in rural central India. J MGIMS. 2009;14(ii):56-63.
20. Bawankule S, Quazi S, Gaidhane A, Khatib N. Delay in DOTS for new pulmonary tuberculosis patient from rural area of Wardha district, India. Online J Health Allied Sci. 2010;9:5.
21. Pradhan A, Kielmann K, Gupte H, Bamne A, Porter JD, Rangan S. What 'outliers' tell us about missed opportunities for tuberculosis control: a cross-sectional study of patients in Mumbai, India. BMC Public Health. 2010;10:263.
22. Rajeswari R, Chandrasekaran V, Suhadev M, Sivasubramaniam S, Sudha G, Renu G. Factors associated with patient and health system delays in the diagnosis of tuberculosis in South India. Int J Tuberc Lung Dis. 2002;6:789-95.
23. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, et al. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. J Clin Epidemiol. 2008 Apr;61(4):344-9.

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