Determinants of Tuberculosis Treatment Outcome among Patients Belonging to the Tea Tribe Community in Dibrugarh District of Assam

Bhupendra Narayan Mahanta[1], Tulika Goswami Mahanta[2], Nabanita Nirmolia[3], Swarnali Devi Baruah[4]

[1]Professor, General Medicine, Lakhimpur Medical College, Lakhimpur, India

[2]Professor, [3]Associate Professor, [4]Statistician, Community Medicine, Department, Assam Medical College, Dibrugarh, India

Correspondence: Dr. Nabanita Nirmolia, E-mail : nabanitanirmolia@yahoo.com

Abstract:

Introduction: Certain social determinants like poverty, malnutrition, indoor air pollution, male gender, diabetes, and cancer are some identified risk factors of TB. The tea garden population as it is socio-economically backward are more vulnerable to get infected. **Objective:** To estimate the determinants of tuberculosis treatment outcomes among patients belonging to the tea tribe community in Dibrugarh District of Assam and to assess the quality of life using WHO-QoL (BREF) instrument. **Method:** A Community-based cross-sectional study was conducted in Dibrugarh District of Assam. A sample size of 930was calculated using nMaster2.0 software, CMC, Vellore, India. From the list of registered TB cases whose treatment was assigned hailing from tea estates,a required sample was selected using a computerized random number. Predesigned, pretested questionnaire was used to assess the demographic, socio-economic, environmental and health-seeking behaviour of the participants. Univariate and bivariate analysis was done. **Results:** Total participation was 785. Regarding environmental determinants, ventilation was very poor and 98.5% used firewood as fuel for cooking. The risk of passive smoking was present in 7.6% of households. Respondents who had a history of family members with chronic cough were present in 5.9%. Loss to follow up rate was 2.9% (23/786). Lack of energy and fatigue was experienced by 83.6%. Marital status, occupation, monthly income, type of family and ventilation were associated with treatment outcome. Gender and socio-economic status of the respondents were associated with knowledge attitude and practice on Hepatitis B among participants which was found to be statistically significant (p-value < 0.0001). **Conclusion:** Certain social and environmental determinants like monthly income, type of family, and inadequate ventilation influence the treatment outcome in the tea garden population. Knowledge and practice pattern for tuberculosis needs to be improved to prevent transmission and alteration in quality of life.

Keywords: Determinants, Environment, Tea tribe, Tuberculosis, WHOQOL – BREF

Introduction:

Tuberculosis is a preventable and curable disease yet has been known as the most infectious killer disease of the world after COVID-19, with 10.6 million people falling ill to it globally in 2022 with a mortality of 1.3 million.[1] Sharing 27% of this global burden, India presently has a point prevalence of 312 per lakh population.[2,3] Among the states in Northeast India, Assam has a total notification rate of 90% both from the public and private sectors in the period January to April 2024.[4] Certain social and environmental risk factors like poor housing,

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malnutrition, and poor ventilation are some identified determinants.[5] Though not all infected will develop the disease, people from socio-economically disadvantaged sections are affected more which may dampen the effort to eliminate TB.[5] Persons suffering from TB face social and economic barriers and stigmatization once diagnosis is made, making them reluctant to seek care.[5]

The present study was carried out in tea city Dibrugarh of Assam, considering the high prevalence among the tea garden plantation workers and families[6] and also inclusion of them in the 100 days TB elimination campaign as one of the vulnerable group[7] with the objectives, to estimate the determinants of tuberculosis treatment outcome among patients belonging to tea tribe community in Dibrugarh District of Assam and to assess the quality of life using WHO-QoL (BREF) instrument.

Method:

A community-based cross-sectional study was conducted in 2021-22 among registered (Nikshay portal) TB cases who already had a treatment assigned, hailing from tea garden community residing in different tea estates of Dibrugarh. Data collection was done by house-to-house visits. Pre-designed formats were used after field testing. All patients willing to participate were included. Severely ill patients, unwilling to give consent, were excluded.

Sample size: Taking prevalence as 312 per lakh population with 10% relative precision and 95% confidence interval the required sample size was 845. Considering the 10% non-response rate sample size becomes 930. From the list of all registered cases as available in the Nikshay portal, undergoing treatment, 930 cases belonging to the tea garden community were selected by computerized random number. Demographic, socio-economic, environmental, knowledge and practice pattern among tuberculosis patients was assessed. Quality of life among those who have completed their treatment without evidence of failure was assessed using WHO-QoL (BREF) instrument.[8] Statistical analysis was done by univariate and bivariate analysis.

Operational definition:

Treatment completed: A person affected by TB who has completed treatment without evidence of failure or clinical deterioration BUT with no record to show that the smear or culture results of biological specimen in the last month of treatment was negative, either because the test was not done or because the result is unavailable.[9]

Cured: A person affected by TB who was microbiologically confirmed for TB at the beginning of treatment but is smear or culture negative at the end of complete treatment.[9]

Loss to follow up: A TB patient previously treated for TB for one month or more and was declared a loss to follow up in the most recent course of treatment.[9]

Ethical consideration: IEC(H) was obtained from the Institutional Ethics Committee (Human) (No.AMC/EC/2563) subject recruitment was done following ethical approval. Written informed consent was sought from each selected participant and those consenting was only included in the study.

Results:

A total of 785 participants were enrolled, with a response rate of 84.4%. Marital status, occupation of the respondents and per capita income according to BG Prasad classification is associated with treatment outcome. (Table 1)

Environmental determinants of the households of study participants: Separate kitchen area and presence of exhaust fan ventilation in the household are significantly associated with the completion of treatment. (Table 2)

Table 1: Socio-demographic details of the patients and their association with tuberculosis treatment outcome (N=785)

Variable		Loss to follow-up (n=23)	Cured/ Treatment completed (n=762)	Overall (n=785)	p-value
Gender					
	Male	13 (56.5%)	436 (57.2%)	449 (57.2%)	0.947
	Female	10 (43.5%)	326 (42.8%)	336 (42.8%)	
Marital Status					
	Married	11 (47.8%)	509 (66.8%)	520 (66.2%)	0.002
	Widow	7 (30.4%)	59 (7.7%)	66 (8.4%)	
	Unmarried	0 (0.0%)	2 (0.3%)	2 (0.3%)	
	Single	5 (21.7%)	192 (25.2%)	197 (25.1%)	
Religion					
	Hindu	23 (100.0%)	734 (96.3%)	757 (96.4%)	0.645
	Muslim	0 (0.0%)	7 (0.9%)	7 (0.9%)	
	Christian	0 (0.0%)	21 (2.8%)	21 (2.7%)	
Caste					
	General	0 (0.0%)	10 (1.3%)	10 (1.3%)	0.58
	OBC	23 (100.0%)	752 (98.7%)	775 (98.7%)	
Type of family					
	Joint	5 (21.7%)	196 (25.7%)	201 (25.6%)	0.666
	Nuclear	18 (78.3%)	566 (74.3%)	584 (74.4%)	
Mobile phone at home					
	None	4 (17.4%)	218 (28.6%)	222 (28.3%)	0.23
	One	12 (52.2%)	408 (53.5%)	420 (53.5%)	
	Two or more	7 (30.4%)	136 (17.8%)	143 (18.2%)	
Education of the respondents					
	Illiterate	10 (43.5%)	256 (30.1%)	239 (30.4%)	0.06
	Primary level	10 (43.5%)	194 (25.5%)	204 (26.0%)	
	Middle level	3 (13.0%)	133 (17.5%)	136 (17.3%)	
	High school	0 (0.0%)	174 (22.8%)	174 (22.2%)	
	Graduate and above	0 (0.0%)	5 (0.7%)	5 (0.6%)	
Occupation					
	Unskilled	11 (47.8%)	296 (38.8%)	307 (39.1%)	0.035
	Skilled labour	2 (8.7%)	280 (36.7%)	282 (35.9%)	
	Business	0 (0.0%)	10 (1.3%)	10 (1.3%)	
	Housewife	5 (21.7%)	51 (6.7%)	56 (7.1%)	
	Cultivator	0 (0.0%)	2 (0.3%)	2 (0.3%)	
	Retired	2 (8.7%)	40 (5.2%)	42 5.4%)	
	Student	3 (13.0%)	56 (7.3%)	59 (7.5%)	
	Unemployed	0 (0.0%)	27 (3.5%)	27 (3.5%)	
Socio-Economic Status					
	Class II	0 (0.0%)	9 (1.18%)	9 (1.2%)	0.000
	Class III	0 (0.0%)	146 (19.16%)	146 (18.6%)	
	Class IV	19 (82%)	439 (57.61%)	458 (58.4%)	
	Class V	4 (18%)	166 (21.78%)	170 (21.7%)	

Table 2: Distribution of study participants according to environmental profile and TB treatment outcome (N=785)

Variable	Defaulter (n=23)	Cured/ Treatment completed (n=762)	Overall (n=785)	p-value
Cross ventilation present at home				
Yes	0 (0.0%)	15 (2.0%)	15 (1.9%)	0.497
No	23 (100.0%)	747 (98.0%)	770 (98.1%)	
Kitchen area separate				
Yes	22 (95.7%)	555 (72.8%)	577 (73.5%)	0.015
No	1 (4.3%)	207 (27.2%)	208 (26.5%)	
Exhaust fan/ ventilation present in the kitchen				
Yes	0 (0.0%)	17 (2.2%)	17 (2.2%)	0.032
No	22 (95.7%)	538 (70.6%)	560 (71.3%)	
Any sputum-positive patients undergoing treatment present in the family				
Yes	0 (0.0%)	31 (4.1%)	31 (3.9%)	0.324
No	100 (100.0%)	731 (95.9%)	754 (96.1%)	
Any family member with chronic cough or h/o respiratory ailment				
Yes	3 (13.0%)	43 (94.4%)	46 (5.9%)	0.137
No	20 (87.0%)	719 (94.4%)	739 (94.1%)	

Table 3: Distribution of the study participants according to health seeking behaviour and its outcome (N=785)

Variable	Loss to follow-up (n=23)	Cured/ Treatment completed (n=762)	Overall (n=785)
How cough and cold with fever managed in the family			
Only Home treatment	3 (13.0%)	55 (7.2%)	58 (7.4%)
Consulted health worker	0 (0.0%)	5 (0.7%)	5 (0.6%)
Visited Health Centre	0 (0.0%)	16 (2.1%)	16 (2.0%)
Hospital	7 (30.4%)	193 (25.3%)	200 (25.5%)
Private practice	0 (0.0%)	2 (0.3%)	2 (0.3%)
Others (specify)	0 (0.0%)	2 (0.3%)	2 0.3%)
Home treatment, Hospital	13 (56.5%)	423 (55.5%)	436 (55.5%)
Different methods along with Home Treatment	0 (0.0%)	66 (8.7%)	66 (8.4%)
Availability of govt. health facility in the area			
Yes	15 (65.2%)	672 (88.2%)	687 (87.5%)
No	8 (34.8%)	90 (11.8%)	98 (12.5%)
Approached Government facility			
Yes	15 (65.2%)	659 (86.5%)	674 (85.9%)
No	8 (34.8%)	103 (13.5%)	111 (14.1%)
Satisfied with health care service provided at Government Facility			
Yes	15 (65.2%)	652 (85.6%)	667 (85.0%)
No	8 (34.8%)	110 (14.4%)	118 (15.0%)
What measures adopted to prevent tuberculosis transmission in the community			
Vaccination	0 (0.0%)	76 (16.0%)	76 (15.4%)
Tonics	0 (0.0%)	115 (24.2%)	115 (23.2%)
Home-based measures (honey, tulsi, amla/lemon juice etc)	0 (0.0%)	8 (1.8%)	8 (1.8%)
Preventing from cold	2 (10.5%)	92 (19.3%)	94 (19.0%)
Safe disposal of sputum	15 (78.9%)	184 (38.7%)	199 (40.2%)
Hand Washing	4 (21.1%)	95 (20.0%)	99 (20.0%)
Social Distancing	13 (68.4%)	141 (29.6%)	154 (31.1%)
Cough Etiquette	0 (0.0%)	100 (21.1%)	100 (20.3%)

Knowledge about tuberculosis, its causation and management

Common ailments occurring in their area was cough (76.7%) followed by fever (60.8%). Regarding smoking as risk factor, 55.8% was said by, while 25.5% said it negatively and 18.7% had no idea about this.

Health care seeking behaviour of the respondent

Loss to follow up was 2.9% (23/785). Availing Govt hospital facility was found in 39.5% if suffered from cough and cold while 35.0% tried to manage it by giving only home treatment. Majority(85.9%) were satisfied with the health care service provided. Statistically significant difference was seen between "Availability of govt. Health facility in the area" amongst loss to follow up and those who completed treatment or cured (p=0.001). Regarding the different measures to prevent tuberculosis transmission in the community in cured/treatment completed group 24.2% believed tonics, 21.1% Cough etiquette can prevent tuberculosis transmission in the community while nobody in the loss to follow up groups believed this (p=0.014; p=0.025. While in loss to follow up group, 78.9% believed that safe disposal of sputum, 68.4% social distancing can prevent tuberculosis transmission in the community as compared to 38.7% and 29.6% respectively in the other group (p<0.05). (Table 3)

Health worker and continuity of treatment:

The majority (92.1%) of respondents were familiar with the health worker/ DOT provider in their area and 69.2% of participants replied positively when asked "Whether health workers contacted them during their illness". In the loss to follow-up group, majority discontinued DOTS after 4 months of treatment and informed (47.8%) that they stopped it because they felt better than earlier.

Quality of life of tuberculosis cases as per WHOQOL BREF questionnaire

Only 3.8% respondents were ill at the time of interview and 75.2% respondents thought that if something was wrong with their health it was due to their illness. Regarding physical health lack of energy and fatigue (83.6%) was common followed by less sleep and rest (20.3%) and pain and discomfort in 4.8%.

Regarding Psychological health: Negative feeling for bodily image and appearance was seen in (5.0%), while positive feeling was present in 86.6%, low self-esteem was informed by (67.0%), lower thinking, learning, memory and concentration was found in (69.0%).

Level of independence: Mobility was less in (61.0%), lower activities of daily living was seen in (92.0%), Dependence on medicinal substances & medical aids was seen in (5.1%), reduced work capacity found in (69.7%).

Social relationship: Mobility for attending different social activity was seen less in (61.7%).

Activities of daily living was (89.6%) while 7.5% showed dependence on medicinal substances & medical aids, Work capacity was reduced to (69.9%).

Social relationship: Personal relationship reduced in (70.1%) participants, while 72.4% require social support and 40% had reduced sexual activity.

Environment: Financial resources were less amongst 63.1% participants, freedom, physical safety and security was lower in 76.6% participants.

Health and social care: Accessibility and quality home environment was not found in 73.4% participants, opportunities for acquiring new information and skills was also found low in 64.2%, participation in and opportunities for recreation/ leisure was found less amongst 60.5%.

Physical environment (pollution/ noise/ traffic/ climate) was found compromised in (62.5%), transport facility was found low in (54.6%).

Spirituality/ Religion/ personal beliefs: Less faith in Religion was evident in 36.6% participants.

Discussion:

Since ancient times human civilization has been undergoing the scourge of tuberculosis as an incurable disease. However, with the introduction of effective drugs it changed from incurable to a much curable disease. But with the spread of drug resistance form and co-infection with HIV, the scenario has worsened leading to declaration by WHO as a global emergency.[10]

Certain social determinants like poor ventilation, overcrowding in homes and workplaces, malnutrition, hunger and poverty are identified risk factors which may not only enhance infection but also increase the severity of the disease.[5] The pool of study participants in the conducted study were males in majority, married, illiterate, unskilled labourers, lived in homes without cross ventilation or exhaust fans, mostly using firewood for cooking. There was a positive association between marital status and status of treatment.

Economic hardship is one of the major reasons for people to discontinue treatment in between as has been cited by other studies.[11] Stigma associated with the disease, lack of social support from family, friends, doubt about recovery after treatment, difficulty from the side effects, feeling of wellness after initiation of treatment and ignorance of consequences of non-adherence may be some reasons of incomplete treatment.[12] Present study showed that occupation of the respondents was associated with treatment status and loss to follow up was more in the unskilled labourer group who were engaged in informal sector owing to loss of wage for repeated visits to health facilities, less literacy and therefore less information, there was a greater probability of discontinuation of treatment.[13] It was noticed that the tea garden management authority took the responsibility of collecting the drugs from district store for their permanent workers and so treatment adherence and completion were more in such workers in comparison to temporary workers who worked as daily wage earners and were unwilling to lose a days wage to visit district store for next doses of medicines and since there was relief of symptoms after initiation of treatment discontinuation was more in the later group. Either because of a secured source of finance or responsibility was also taken by Tea garden management, treatment completion and recovery were noticed more in the permanent worker group. Moreover monthly income in joint families, availability of housing amenities like exhaust ventilation, separate kitchen area were associated with uptake of treatment in present study and these factors are considered as indicators of improved socio economic condition[14] While previous study have measured that poverty, poor socio economic condition hinder treatment adherence and successful outcome.[11]

Treatment adherence may also be affected by misconceptions and lack of information on transmission of disease, necessity of early diagnosis and treatment, as delayed or irregular treatment may facilitate relapse, resistance or death.[15] Knowledge on tuberculosis reduces the barriers by enhancing access to treatment.[16] Such knowledge can be regarding following cough hygiene, avoiding unnecessary spitting for TB prevention.[15] Knowledge on safe disposal of sputum, distancing

and maintaining adequate cough etiquette was associated with intake of treatment in present study as a measure for prevention of indiscriminate transmission of disease in the community. Approach of the health care providers, willingness to serve and address the spread of misinformation, satisfaction with care provided and availability of government health facilities in the area for free medications service is another facilitator for treatment adherence, as travel cost may be a reason for noncompliance.[15,17] Nestled in some isolated community within the tea gardens, the workers remain separated from the general population and may be ignorant of the disease and services. Hence health care providers can bring a difference in this regard.

Diagnosis of TB may cause psychological disturbance in the patient which may accentuate physical illness and there may be sleeplessness, anxiety, tiredness, anorexia, weight loss, mood disorder etc which may reduce the quality of life (QoL).[18] This study reported negative feelings with low self-esteem and thinking, lack of memory and concentration as dimension of psychological health and lack of energy and fatigue, low sleep as the dimension of physical health among the affected. Besides these, reduced work capacity with less mobility, dependence on medicines and other aids, less personal relationships and social activity, less involvement in recreational activity with depletion on financial resources and less freedom and sense of security were other parameters experienced by the affected individuals. So, perceived perceptions implies that along with physical health, there is deterioration of quality of life (QOL) of TB patients. However, with integrated TB treatment strategies, QoL may improve as was reported from a number of studies and the scores may even help to identify the patients who have discontinued treatment.[19] So, a hand holding approach will reduce the loss to follow up with a rise in QoL.

The strength of present study is that it can be the beginning to study the barriers to treatment adherence. Since it was a cross-sectional study, it can be considered as a limitation as treatment outcome of all subjects remained unknown and addition of a qualitative component may further improve understanding the barriers better.

Conclusion:

Different determinants working in different setting may influence the profile of TB patients and their uptake of treatment and also quality of life of the patients. Hence, efforts should be to address the determinants by shared approach among various stakeholders both within and outside the health sector.

Declaration:

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Conflicts of interest: Nil

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