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Non Adherence to Anti-Tuberculosis treatment and associated factors among TB patients – A cross sectional study

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Abstract

BACKGROUND

Non-adherence to anti-tuberculosis treatment (ATT) remains a major barrier to effective tuberculosis (TB) control, contributing to treatment failure and drug resistance. Identifying the magnitude and determinants of non-adherence is essential for improving treatment outcomes.

METHODS

A hospital-based cross-sectional study was conducted among 65 TB patients receiving ATT under the National Tuberculosis Elimination Programme at Dr. Ambedkar Medical College, Bengaluru, from April 2024 to March 2025. Data were collected using a pre-tested semi-structured questionnaire and relevant treatment records.

RESULTS

The mean age of participants was 44.6 ± 12.8 years, with 61.5% males. The prevalence of non-adherence was 21.5%. Non-adherence was significantly higher among patients with lower educational status (p=0.04), lower socioeconomic class (p=0.03), substance use (p=0.01), presence of drug side effects (p=0.005), and poor family support (p=0.01). Higher non-adherence was observed among patients in the intensive phase of treatment and those residing farther from the health facility, though these associations were not statistically significant.

CONCLUSION

Non-adherence to ATT remains a significant concern and is influenced by multiple socio-demographic, behavioral, and treatment-related factors. Strengthening patient education,

managing drug side effects, and improving social support systems are essential to enhance adherence and treatment outcomes.

KEYWORDS
Tuberculosis, Non-adherence, Anti-Tuberculosis Treatment, Determinants, NTEP

INTRODUCTION

Tuberculosis (TB) remains one of the leading infectious causes of morbidity and mortality worldwide, particularly in low- and middle-income countries. India bears the highest burden globally, accounting for nearly 26% of total TB cases, making TB control a major public health priority.[1] Although there has been a decline in incidence from 237 per lakh population in 2015 to 187 per lakh in 2024, the disease continues to pose significant challenges.[2]

The Government of India, through the National Tuberculosis Elimination Programme (NTEP), has implemented strategies such as early diagnosis, free treatment, and adherence support mechanisms. These efforts have resulted in improved treatment outcomes, with success rates approaching 90%.[3] However, issues such as delayed diagnosis, stigma, and socioeconomic barriers continue to affect effective disease control.[4]

Adherence to anti-tuberculosis treatment (ATT) is critical for achieving cure and preventing relapse, treatment failure, and the emergence of drug-resistant TB. The standard treatment regimen requires prolonged multidrug therapy for at least six months, making sustained adherence essential. Non-adherence not only compromises individual patient outcomes but also contributes to ongoing transmission and the development of drug resistance, which remains a significant concern in India.[5-7]

The magnitude of non-adherence varies widely across settings. Studies have reported non-adherence rates ranging from 8.4% to 55.8%, reflecting variability across populations and healthcare systems.[8] Indian studies have documented substantial levels of non-adherence, in some instances reaching up to 50%, highlighting the seriousness of the problem.[9] Adherence to DOTS therapy has also been reported to vary between 45% and 93%, indicating inconsistencies in treatment compliance.[10]

Non-adherence to ATT is influenced by multiple factors, including patient-related, socio-demographic, therapy-related, and health system-related determinants. Key factors include lack of awareness, stigma, adverse drug reactions, financial constraints, and poor accessibility to healthcare services.[4,7,8] In addition, inadequate social support and poor patient-provider interaction have been shown to significantly contribute to treatment default.[11-13]

Despite ongoing programmatic efforts, non-adherence continues to persist, underscoring the need for context-specific research to identify local determinants. Understanding the prevalence and associated factors is essential for strengthening TB control strategies and improving treatment outcomes.

Against this background, the present study was undertaken to assess the prevalence of non-adherence to anti-tuberculosis treatment and its determinants among tuberculosis patients.

MATERIALS AND METHODS

A hospital-based cross-sectional study was conducted among tuberculosis (TB) patients receiving anti-tuberculosis treatment (ATT) under the National Tuberculosis Elimination Programme (NTEP) at Dr. Ambedkar Medical College, Bengaluru, over a period of Six Month

from July 2025 to December 2025. Based on the average patient load of approximately 10–12 TB patients per month at the study centre, all eligible patients attending the DOTS centre and outpatient department during the study period were included. A total of 65 patients who met the eligibility criteria were enrolled in the study.

All patients aged ≥18 years, diagnosed with pulmonary or extrapulmonary TB, and on ATT for at least one month were included. Patients who were seriously ill, unable to respond, or not available after two consecutive visits were excluded. A consecutive sampling technique was employed, wherein all eligible patients presenting during the study period were recruited until the end of the study duration.

Data were collected using a pre-tested, semi-structured questionnaire administered through face-to-face interviews. Information regarding socio-demographic characteristics, clinical profile, treatment details, adherence status, and factors influencing adherence was obtained. Relevant clinical details were also extracted from treatment cards and TB registers maintained at the study centre. Non-adherence was operationally defined as interruption of treatment for two or more consecutive weeks during the treatment period.

The collected data were entered into Microsoft Office Excel 2007 and analyzed using IBM Statistical Package for the Social Sciences (SPSS) version 21 (IBM Corp., Armonk, NY, USA). Descriptive statistics such as frequencies and percentages were used to summarize the data. The association between non-adherence and independent variables was assessed using the Chi-square test or Fisher's exact test, as appropriate. A p-value of <0.05 was considered statistically significant.

Ethical clearance was obtained from the Institutional Ethics Committee of Dr. Ambedkar Medical College. Permission was obtained from the concerned authorities prior to the study. Written informed consent was obtained from all participants, and confidentiality and anonymity were strictly maintained throughout the study.

RESULTS

A total of 65 tuberculosis (TB) patients were included in the study. The mean age of the participants was 44.6 ± 12.8 years. The majority belonged to the 31–45 years age group (40.0%), followed by 46–60 years (26.2%). Males constituted 61.5% of the study population (Table 1).

Most participants had at least secondary level education, with only 1.5% being illiterate. According to the Modified Kuppuswamy socioeconomic scale, the majority belonged to the lower middle (32.3%) and upper middle (27.7%) classes, while only 6.2% were in the lower class (Table 1).

With respect to clinical profile, 64.6% of patients had pulmonary tuberculosis, while 35.4% had extrapulmonary TB. The majority (63.1%) were in the continuation phase of treatment. Comorbidities were present in 29.2% of patients, with diabetes mellitus being the most common (47.4%), followed by hypertension (26.3%) and chronic respiratory diseases (15.8%). Substance use was reported by 30.8% of participants (Table 2).

The overall prevalence of non-adherence to anti-tuberculosis treatment was 21.5%, with 14 out of 65 patients being non-adherent (Table 3).

Analysis of factors associated with non-adherence showed that a higher proportion of non-adherence was observed among males (25.0%) compared to females (16.0%), although this difference was not statistically significant ($p = 0.39$). Educational status showed a statistically

significant association, with patients having primary education or less demonstrating higher non-adherence (40.0%) compared to those with secondary education and above (16.0%) (p = 0.04). Socioeconomic status was also significantly associated, with higher non-adherence among patients belonging to lower and upper lower classes (38.9%) compared to higher socioeconomic groups (14.9%) (p = 0.03). Substance use was significantly associated with non-adherence, with 40.0% of substance users being non-adherent compared to 13.3% among non-users (p = 0.01). (Table 4).

Among additional factors, drug side effects were significantly associated with non-adherence, with 44.4% of patients experiencing side effects being non-adherent compared to 12.8% among those without side effects (p = 0.005). Family support was also significantly associated, as patients with poor family support had higher non-adherence (43.8%) compared to those with good support (14.3%) (p = 0.01) (Table 4).

Variables		No. of Study Participants	Percentage
Age group (years)	18–30	11	16.9 %
	31–45	26	40 %
	46–60	17	26.2 %
	>60	11	16.9 %
Gender	Male	40	61.5 %
	Female	25	38.5 %
Education	Illiterate / Non Formal Education	1	1.5 %
	Primary	14	21.5 %
	Secondary	27	41.5 %
	Graduate & above	23	35.5 %
Socio-economic status (Modified Kuppuswamy scale)	Upper	8	12.3 %
	Upper middle	18	27.7 %
	Lower middle	21	32.3 %
	Upper lower	14	21.5 %
	Lower	4	6.2 %

Table 1: Sociodemographic characteristics of the study participants

Variable		No. of Study Participants	Percentage
Type of TB	Pulmonary	42	64.6%
	Extrapulmonary	23	35.4%
Phase of treatment	Intensive phase	24	36.9%
	Continuation phase	41	63.1%
Comorbidities	Present	19	29.2%
	Absent	46	70.8%
Type of comorbidities	Diabetes mellitus	9	47.4%
	Hypertension	5	26.3%
	Chronic respiratory disease (COPD/asthma)	3	15.8%
	Others	2	10.5%
Substance use	Present	20	30.8%

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	Absent	45	69.2%

Table 2: Clinical Profile of the study participants

Adherence Status	No. of Study Participants	Percentage (%)
Adherent	51	78.5%
Non-adherent	14	21.5%

Table 3: Prevalence of Non Adherence to Anti Tuberculosis Treatment (ATT)

Variable		Non-adherent n (%)	Adherent n (%)	p-value
Gender	Male	10 (25.0)	30 (75.0)	0.3904
	Female	4 (16.0)	21 (84.0)	
Education	≤Primary	6 (40.0)	9 (60.0)	0.0473*
	≥Secondary	8 (16.0)	42 (84.0)	
Socioeconomic status	Lower + Upper lower	7 (38.9)	11 (61.1)	0.0352*
	Others	7 (14.9)	40 (85.1)	
Substance use	Present	8 (40.0)	12 (60.0)	0.0157*
	Absent	6 (13.3)	39 (86.7)	
Treatment phase	Intensive	8 (33.3)	16 (66.7)	0.0767
	Continuation	6 (14.6)	35 (85.4)	
Drug side effects	Present	8 (44.4)	10 (55.6)	0.0054*
	Absent	6 (12.8)	41 (87.2)	
Distance to health facility	>5 km	7 (35.0)	13 (65.0)	0.0783
	≤5 km	7 (15.6)	38 (84.4)	
Family support	Poor	7 (43.8)	9 (56.2)	0.0128*
	Good	7 (14.3)	42 (85.7)	

Table 4: Factors associated with Non Adherence to ATT in the study population

DISCUSSION

The present study assessed the prevalence of non-adherence to anti-tuberculosis treatment (ATT) and its associated factors among tuberculosis patients. The prevalence of non-adherence observed in this study was 21.5%, which is comparable to findings from other studies. Jaiswal et al. reported non-adherence of approximately 20–25% among TB patients in central India,[8] while Das et al. reported varying levels of adherence under DOTS, with non-adherence ranging between 15% and 30%.[10] Similar findings have been reported in Indian settings, where treatment default has been documented under programmatic conditions, with various socio-demographic and behavioral factors influencing adherence.[14] These findings indicate that despite improvements under the National Tuberculosis Elimination Programme, non-adherence continues to remain a significant challenge.

In the present study, non-adherence was significantly higher among patients with lower educational status. This is consistent with previous studies which have demonstrated that poor literacy is associated with inadequate understanding of disease and treatment regimens, leading to early discontinuation once symptoms improve.[9] Patients belonging to lower socioeconomic groups also showed significantly higher non-adherence. Financial constraints, indirect costs, and

competing livelihood priorities may contribute to this observation, as highlighted in an Indian study by Roy et al.[13]

Substance use emerged as a significant determinant of non-adherence in this study. Patients with a history of alcohol or substance use were more likely to miss doses, which is in agreement with findings from Gebremariam et al.[9] Behavioral factors such as substance use may interfere with regular medication intake and reduce adherence to long-term treatment. Similar observations have been reported in qualitative studies, where behavioral and psychosocial factors have been identified as important contributors to poor adherence.[11]

Treatment-related factors also played an important role. Patients experiencing drug side effects were significantly more likely to be non-adherent. Adverse drug reactions are recognized barriers to adherence, as they may discourage patients from continuing treatment, particularly in the absence of adequate counseling and support.[11,12] In addition, fear of side effects and inadequate knowledge regarding their management have been highlighted as contributing factors in previous studies.[12]

Family support was found to be significantly associated with adherence. Patients with poor family support had higher non-adherence, which is consistent with existing literature emphasizing the importance of social support in ensuring treatment completion.[12] Lack of family involvement and social stigma may negatively impact treatment adherence and completion.

Although higher non-adherence was observed among patients in the intensive phase of treatment and those residing farther from the health facility, these associations were not statistically significant. However, similar trends have been reported in previous studies, suggesting that treatment burden during the intensive phase and accessibility barriers may influence adherence behavior.[7,15]

Overall, the findings of the present study indicate that non-adherence to ATT is a multifactorial issue influenced by socio-demographic, behavioral, treatment-related, and social factors. These findings are consistent with existing literature and highlight the need for comprehensive, patient-centered interventions, including improved health education, early identification and management of drug side effects, and strengthening of family and social support systems to enhance treatment adherence.

CONCLUSION

The present study found that non-adherence to anti-tuberculosis treatment was prevalent among a considerable proportion of patients. Non-adherence was significantly associated with lower educational status, lower socioeconomic class, substance use, drug side effects, and poor family support. These findings indicate that both patient-related and treatment-related factors play an important role in influencing adherence to therapy. Strengthening patient education and counseling, early identification and management of drug side effects, targeted support for patients from lower socioeconomic groups, involvement of family members, and addressing substance use through appropriate interventions may help improve treatment adherence and overall outcomes.

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