

## Original Article

# A Study of Factors Affecting Treatment Compliance Among Tuberculosis Patients Visiting Tertiary Care Hospital Bahawalpur

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### Abstract

**Background:** Pulmonary tuberculosis is a leading cause of mortality, particularly in lower-middle-income countries like Pakistan. The adherence to treatment is crucial for its effectiveness. Various factors affect treatment compliance among tuberculosis patients including knowledge, monthly income, level of education, side effects of medications, treatment duration, social support. However, treatment compliance can be improved by developing effective strategies.

**Objective:** To determine various factors that affect treatment compliance among tuberculosis patients of Pulmonology ward and outpatient department, Bahawal Victoria Hospital, Bahawalpur.

**Methods:** A descriptive cross-sectional study was conducted during May -September 2024 in pulmonology ward and OPD, BVH, Bahawalpur. The sample size 162, calculated by using Raosoft sample size calculator was recruited by Non-probability convenient sampling. The data was collected through a preformed questionnaire having three sections including questions regarding demographic details and the status of patient's compliance to the treatment and different factors that affect treatment compliance. The data was analyzed using SPSS software, version 26. Chi square test of significance was applied.

**Results:** Out of the sample of 162 respondents, 34.3% were illiterate and 27.1% had received primary education. About 39.8% had monthly income of >40k, 38% had 20-40k and 22.3% had less than 20k. About 82.5% patients were taking their TB medication regularly while 15.7% were noncompliant. Whereas 58% patients were convinced that anti-TB drugs had serious adverse effects while 42% patients negated it.

**Conclusion:** Patients with higher level of education and greater family support tend to follow their treatment better. Factors like good socioeconomic status and gender did not show a statistically significant relationship with treatment compliance. However, social stigma present challenges to treatment compliance. Addressing these issues through education, family involvement, and better management of social stigma can improve treatment outcomes.

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### Introduction

Pulmonary tuberculosis (TB) is a persistent lung infection caused by the bacterium Mycobacterium tuberculosis that spreads through respiratory droplets. Additionally, transmission occurs via mouth,

intestines, or skin.<sup>1</sup> Key diagnostic tests for the suspected patients include culture (the gold standard), microscopy, sputum nucleic acid amplification tests on and imaging. Standard treatment begins with a combination of isoniazid, rifampicin, ethambutol, and pyrazinamide, followed by isoniazid and rifampicin alone. Though, the knowledge regarding factors affecting treatment compliance is essential for a patient's full recovery.<sup>2</sup> Combating any disease requires effective knowledge because it's a crucial factor in altering a person's behavior. Treatment compliance is measured over a specific period and expressed as a percentage. According to the World Bank, Pakistan lies in the lower middle-income region of the world economically which poses certain challenges in combating TB. These include low case notification rates, poor patient care, limited diagnostic capacity for drug-resistant TB, issues with treatment adherence, and inadequate dissemination of MDR-TB guidelines. There is also a lack of research on MDR-TB's molecular epidemiology and transmission in high-endemic regions.<sup>3</sup> One of the biggest challenges for most TB programs is the issue of non-compliance with treatment among TB patients. Among the most common reasons for non-compliance with TB treatment are patients' belief that they are cured and the burden of managing multiple medications.

Despite extensive efforts in vaccination and chemotherapy, TB remains to be the foremost cause of mortality from an infectious agent, exceeding HIV/AIDS. WHO estimates almost 10.4 million new cases and 1.8 million deaths from Tuberculosis each year.<sup>1</sup> Pakistan is recognized as a heavily affected TB country, contributing to almost two-thirds of the estimated 10 million global TB cases.<sup>4</sup> In 2016, 80% of all reported TB cases were pulmonary tuberculosis (PTB), and 4% of these cases were also known to be HIV-positive.<sup>5</sup> This study has the potential to significantly affect public health strategies by elucidating the impact of multiple factors on TB treatment compliance. Enhanced patient education could improve compliance, decrease treatment failures, and lower TB incidence and mortality rates. By investigating the relationship between multiple factors and treatment adherence, this research will contribute valuable insights into effective health interventions that would assist healthcare providers in designing targeted programs and advising policymakers on integrating educational components into TB control strategies.

The objective of the study was to determine various factors that affect treatment compliance among tuberculosis patients of Pulmonology ward and Outpatient department, BVH, BWP.

## Methods

It was a descriptive cross-sectional study, conducted in Pulmonology ward and outpatient Department, Bahawal Victoria Hospital, Bahawalpur during May 2024 to September 2024. It included active male and female TB patients of 18 years and older who were receiving treatment at the Pulmonology ward and OPD BVH. However, patients under 18 years of age, having mental disorder, unwilling to cooperate and having language barrier were excluded from the study. The study received approval from the Institutional Review Board (IRB) of the Quaid e Azam Medical College Bahawalpur (Ref N0. 2825/24/11). The sample size of our study was 162, calculated by using Raosoft sample size calculator ( $p=12\%$ ,  $z=1.96$ ,  $e=5\%$ ) recruited by non-probability convenient sampling. Informed consent was taken from all the patients. Data was collected through a pre-formed questionnaire having three separate sections. Section 1 included 6 questions regarding demographic details of the patients while section 2 contained a total of 19 close ended questions regarding the status of patient's compliance to the treatment and different factors that affect treatment compliance. Treatment Compliance was operationalized as: 1. Patients taking medicines consistently. 2 Patients taking medicines as prescribed by the doctor. 3 Patients visiting the clinic on their exact date of appointment. The data was entered and analyzed using SPSS software; version 26. Mean and standard deviation for age was calculated. Frequencies and percentages were calculated for qualitative variables. Chi square test of significance was applied. "P" value of  $\leq 0.05$  was taken as statistically significant.

## Results

Of the total 162 respondents, 62.3% were male and 37.7% were female. The mean age of the respondents was 45.51 with standard deviation of 15.105. The analysis revealed that 34.6% of the patients were illiterate, 27.8% had completed primary education, 25.3% had secondary education, and 12.3% were attending college or university. Among the patients, 39.5% had a family income of over 40k, 38.3% earned between 20k-40k, and 22.2% had less than 20k. Results also indicated that 56.8% of the patients belonged to families with more than 5 members, 30.9% had 3-5 members, and 12.3% had small families of just 2 people. Additionally, 58.6% were non-smokers, while 41.4% were smokers. (Table 1)

The results showed that 83.3% of patients were consistently taking their TB medication (compliant) while 16.7% were non-compliant. Additionally, 70.4% had been taking their medication as prescribed by their

doctor (compliant), while 29.6% had not (non-compliant). The results also showed that 60.5% of patients visited the clinic on their exact appointment date (compliant) and 39.5% did not (non-compliant).

**Table 1:** Sociodemographic Variables Of the Respondents

Variables	Frequency	Percentage
<b>Gender</b>		
Male	101	62.3
Female	61	37.7
<b>Level Of Education</b>		
Illiterate	56	34.6
Primary	45	27.8
Secondary	41	25.3
College/university	20	12.3
<b>Monthly Income</b>		
<20k	36	22.2
20-40k	62	38.3
>40k	64	39.5
<b>No. Of Family Members</b>		
>5	92	56.8
3-5	50	30.9
2	20	12.3
<b>Smoking Status</b>		
Yes	94	58.6
No	68	41.4

The results showed that 83.3% of patients were consistently taking their TB medication (compliant) while 16.7% were non-compliant. Additionally, 70.4% had been taking their medication as prescribed by their doctor (compliant), while 29.6% had not (non-compliant). The results also showed that 60.5% of patients visited the clinic on their exact appointment date (compliant) and 39.5% did not (non-compliant). The study showed that 80.9% were already aware of TB, while 19.1% had no knowledge of the disease. It also highlighted that 53.7% had no family history of TB, 37.7% did, and 8.6% were uncertain. When patients were asked if TB was curable, 80.2% believed it has a cure, 10.5% thought it was incurable, and 8.6% were uncertain. When asked about adverse effects, 58% reported experiencing side effects from the medication, while 42% did not. Among the patients, 50% admitted they never forgot to take their medication, while the other 50% did.

Moreover, 86.4% believed that following the treatment plan would improve their health, whereas 13.6% disagreed. Regarding the time taken to reach the TB clinic, 46.3% of patients travelled 20-30 minutes, 34% took more than 30 minutes, and 19.8% required less than 20

minutes. As for the inconvenience of taking medication daily, 64.8% reported experiencing it, while 35.2% did not.

Additionally, 53.7% of patients had a fear of hospitalization, 37.7% did not, and 8.6% sometimes experienced this fear. Regarding the consequences of irregular medication use, 51.2% experienced serious effects, 35.2% experienced minor, and 13.6% experienced no effects. The results also indicated that 67.3% of patients believed

**Table 2:** Social Stigma and Treatment Compliance

Social Stigma	Treatment Compliance		Total
	Yes	No	
Yes	50	42	102
No	54	06	60
Total	114	48	162

$\chi^2=17.69$   $p=0.022$

they should stop treatment only on their doctor's advice, while 17.9% thought they could stop once they felt better, and 14.8% were unsure.

In terms of social stigma, 63% feared they would be socially isolated if others knew about their TB, while 37% believed they wouldn't face social exclusion showing a statistically significant relationship with treatment compliance ( $p<0.05$ )(Table 2).

**Table 3:** Level of Education and Treatment Compliance

Level of Education	Treatment Compliance		Total
	Never	Yes	
Never		21	35
Primary		38	07
Secondary		37	04
College/university		18	02
Total		114	48

$\chi^2= 44.72$   $p=0.019$

The study also revealed that 80.8% had family supervision when taking their medication, and 19.1% never had supervision showing a statistically significant relationship with treatment compliance ( $\chi^2=12.33$   $p=0.04$ ).

The factors like gender and monthly income showed no statistically significant relationship with treatment compliance ( $\chi^2=0.866$   $p\text{-value}=0.649$ ) ( $\chi^2=1.264$   $p=0.974$ ) respectively. However, a statistically significant relationship between level of education of the respondents and treatment compliance was found ( $p<0.05$ ) (Table 3)

## Discussion

Our research investigates multiple factors that affect treatment compliance among tuberculosis (TB) patients

by analyzing a dataset involving demographic, socio-economic, and health-related statistics, ultimately suggesting targeted interventions to improve patient care and reduce disease transmission.

The data of our study reveals that the majority of the study population was male (61.4%). This finding aligns with previous research done in Mardan (2019) which states that 66% of the reported patients were male.<sup>1</sup> This might be possible due to more men seeking medical care as compared to women.

In our study a significant portion of the patients had a relatively high monthly income. This contrasts with the study done in Bangladesh, where the prevalence of TB was significantly higher in the lower two quartiles of socioeconomic position (95.4 and 118.4 per 100,000 in lower socioeconomic position versus 19.5 in the highest socioeconomic position).<sup>6</sup>

According to the results of our study, a substantial portion of the patient population was smokers (40.4%) similar to the results of a study conducted in Indonesia.<sup>7</sup> This seems to be a concerning statistic because smoking is one of the major risk factors for lung cancer and respiratory diseases. In contrast a study conducted in Bangladesh and Pakistan, revealed a low smoking prevalence (22.5%).<sup>8</sup> This difference depicts that either the smoking habits of TB patients have changed over the time or there is a change in populations demographics.

In our study only 37.3% of respondents reported a family history of TB indicating that most of the respondents do not have a direct familial link to the disease. Similar results were found in a study conducted in Indonesia (34%).<sup>9</sup> This suggests that family history may influence awareness, but it is not a major factor for TB patients in both studies. In our research, 57.8% of respondents reported experiencing no adverse effects from anti-TB drugs, indicating that the treatment regimen was well-tolerated. In contrast a past research from Ethiopia showed a higher proportion of respondents experiencing adverse drug reactions.<sup>10</sup>

In our study, 82.5% of respondents took medicines consistently (compliance), similar to the results of a study carried out in Ndola, Zambia where the compliance rate was 70.2%.<sup>11</sup> This improvement could be due to increased awareness and better management strategies over time. However, contrasting results (44%) were found in a study conducted in Rawalpindi.<sup>12,13</sup>

Our study showed an impressive number (70.4%) of participants taking their TB medication as prescribed by their doctor (compliance). This indicates that despite challenges of adverse effects and inconvenience, most

patients were committed to follow their treatment regimen. Similarly results (90.6%) were found in a study conducted in 2020 Gondar city.<sup>14</sup> However, this was in contrast (29.8%) to the research from Ethiopia.<sup>15</sup> Our study found no statistically significant relationship ( $p>0.05$ ) between treatment compliance and monthly income of the respondents. This finding was in contrast to both the studies where a significant relationship was found. However, the finding of significant relationship between treatment compliance and level education in our study was in line with the above said studies. In our study gender was not statistically associated with the treatment compliance ( $p>0.05$ ). This finding was supported by the results of a study conducted in Ethiopia.<sup>16</sup>

In our study significant portion of respondents (43.4%) reported experiencing social stigma. These results were in line with a research which found that 37.5% of TB patients experienced social isolation, 25% faced verbal abuse, and 37.5% were subjected to different social treatment due to their disease. Moreover, stigma was shown to contribute to non-compliance with TB treatment ( $p<0.01$ ) according to the results of a study conducted in India<sup>17</sup> and Malaysia<sup>18</sup> and Germany.<sup>19</sup> Similarly a statically significant ( $p<0.05$ ) relationship between social stigma and treatment compliance was found in our study.

In our study 62% of participants reported that their family members supervised their medication intake showing a statistically significant relationship ( $p<0.05$ ) between family support and treatment compliance. This finding highlights the importance of involving family members in the treatment process. Similar results were found in researches conducted in Peru and China.<sup>20,21</sup>

The association between level of education and treatment compliance strongly supports the evidence that by finding practical ways of improving literacy rate, much better treatment compliance can be achieved in the community. However, the study lacks the view of the patients coming in the private sector for treatment, limiting the generalizability.

## Conclusion

The study highlights multiple factors that affect treatment adherence among tuberculosis patients in Bahawalpur, Pakistan. Factors like level of education and family support positively impacted treatment compliance, while social stigma present challenges. Although most patients stuck to their treatment, some stopped prematurely due to lack of knowledge or experience of adverse effects. Addressing these issues through better education, greater family involvement, and better management of

social stigma can improve the treatment compliance and outcomes and reduce TB prevalence.

**Ethical Approval:** The Institutional Ethical Review Board, Quaid-e-Azam Medical College, Bahawalpur approved this study vide letter No. 2825/ DME/ QAMC Bahawalpur.

**Conflict of Interest:** The authors declare no conflict of interest.

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### Author's Contribution

**SH:** Conception & design, acquisition of data, critically revised it for important intellectual content, final approval of the version to be published

**HA:** Analysis & interpretation of data, drafting of article, final approval of the version to be published

**MN:** Analysis & interpretation of data, drafting of article, critically revised it for important intellectual content

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