Original Research Paper

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Respiratory Medicine

STUDY OF CLINICAL, BACTERIOLOGICAL, RADIOLOGICAL PROFILE AND TREATMENT OUTCOME IN SMOKERS VS NON-SMOKERS SUFFERING FROM PULMONARY TUBERCULOSIS.

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ABSTRACT **Background:** Tuberculosis (TB) remains a major global health burden, particularly in countries like India with high TB prevalence and smoking rates. Smoking is a known risk factor that adversely affects the clinical course and treatment outcomes of pulmonary TB. **Objective:** To compare the clinical, bacteriological, and radiological profiles, along with treatment outcomes, between smokers and non-smokers diagnosed with pulmonary tuberculosis. **Methods:** This observational cohort study was conducted at a tertiary care hospital from January 2020 to December 2022. A total of 87 newly diagnosed pulmonary TB patients were enrolled, including 42 smokers and 45 non-smokers. Data were collected on demographic characteristics, clinical features, sputum AFB grading, chest X-ray findings, and response to treatment at the end of the intensive phase (IP) and continuation phase (CP). Statistical analysis was performed using SPSS v21. **Results:** Smokers had a higher mean age (46.38±15.31 years) compared to non-smokers (34.69±14.67 years). The majority of smokers were male (92.86%) while most non-smokers were female (82.22%). Smokers showed a higher sputum bacillary load at presentation, lower sputum conversion at the end of IP (only 19.05% negative in smokers vs 82.22% in non-smokers; $p<0.0001$), and less radiological clearance. Clinical symptoms such as cough, fever, and loss of appetite were more persistent in smokers. Complete radiological clearance at the end of CP was achieved in 80% of non-smokers versus 59.52% of smokers. **Conclusion:** Smoking significantly impairs the clinical, bacteriological, and radiological response to TB treatment. Smokers experience delayed sputum conversion, more extensive lung involvement, and poorer symptom resolution. Integrating smoking cessation programs into TB care is essential to improve treatment outcomes.

KEYWORDS : Pulmonary tuberculosis, smoking, sputum conversion, radiology, treatment outcome, clinical profile.

INTRODUCTION

Tuberculosis (TB), primarily caused by Mycobacterium tuberculosis, remains one of the top ten causes of death worldwide. The burden of TB is particularly heavy in countries like India, which has both a high TB incidence and one of the largest populations of tobacco users[1]. Tobacco smoke compromises pulmonary immunity, reduces mucociliary clearance, and impairs macrophage function, making smokers more vulnerable to TB infection[2]. Despite advances in TB control strategies, comorbid conditions such as smoking continue to influence the outcomes of anti-TB treatment (ATT)[3]. This study seeks to evaluate and compare the clinical, bacteriological, and radiological profiles and treatment outcomes of smokers and non-smokers suffering from pulmonary tuberculosis[4].

Aims And Objectives

The primary aim of the study is to evaluate the effect of smoking on treatment outcomes in pulmonary tuberculosis. Specific objectives include:

- To compare the clinical, bacteriological, and radiological presentations in smokers and non-smokers.
- To determine the sputum conversion rate at the end of the intensive and continuation phases of ATT.
- To assess the overall response to treatment and resolution of symptoms in both groups.

MATERIALS AND METHODS

This observational cohort study was conducted in the Department of Respiratory Medicine at a tertiary care hospital from January 2024 to December 2024. A total of 87 newly diagnosed pulmonary TB patients were included: 42 smokers and 45 non-smokers. Patients were selected based on inclusion criteria such as microbiological confirmation of TB and age above 18 years. Patients with extra-pulmonary TB, drug-resistant TB, HIV, or comorbid conditions like diabetes and those unwilling to provide informed consent were excluded[5].

The smoking index was calculated by multiplying the number of cigarettes or beedis smoked per day by the number of years of smoking. Patients were categorized as mild (SI<100), moderate (100–299), and heavy smokers (≥300). Data collection included demographic details, clinical symptoms, sputum AFB smear (using ZN staining), CBNAAT, and chest X-ray. Treatment was administered as per NTEP guidelines. Patients were followed at the end of the intensive phase (2 months) and continuation phase (6 months). Statistical analysis was conducted using SPSS version 21 with significance set at $p<0.05$.

RESULTS

Table 1: Age-wise Distribution

Age Group (Years)	Number of Cases (%)
18–30	27 (31%)
31–40	14 (16%)
41–50	12 (13%)
51–65	34 (39%)

Table 2: Gender Distribution In Smokers Vs Non-smokers

Gender	Smokers (%)	Non-Smokers (%)
Male	92.86%	17.77%
Female	7.14%	82.22%

Smokers had higher AFB grading at presentation, lower rates of sputum conversion at the end of IP and CP, and more severe radiological findings compared to non-smokers. Non-smokers demonstrated higher rates of clinical improvement, sputum clearance, and radiological resolution[6].

The mean age of smokers was 46.38±15.31 years, significantly higher than non-smokers at 34.69±14.67 years ($p<0.0005$). Gender distribution showed a significant male predominance among smokers (92.86%) and female predominance among non-smokers (82.22%). At

presentation, 35.71% of smokers had 1+ AFB grade while 55.56% of non-smokers also had 1+. Higher AFB grades (2+ and 3+) were more common in smokers. At the end of the intensive phase, 61.9% of smokers were still AFB positive (1+) compared to only 11.11% of non-smokers. By the end of the continuation phase, 83.33% of smokers had converted to smear-negative compared to 97.78% of non-smokers. Radiological assessment revealed that smokers had more moderate to severe lung infiltrates while non-smokers had more minimal infiltrates and normal findings.

Clinical symptoms such as cough, fever, loss of appetite, and weight loss were more prevalent and persistent in smokers. Cough resolution was observed in 73.81% of smokers versus 77.78% of non-smokers at the end of treatment[7]. Appetite improvement was seen in 15.56% of smokers and 30.95% of non-smokers. Radiological clearance (complete or partial) was higher in non-smokers both at the end of IP and CP[8]. Statistical analysis demonstrated significant differences ($p<0.0001$) in sputum conversion rates and radiological resolution between the two groups[9].

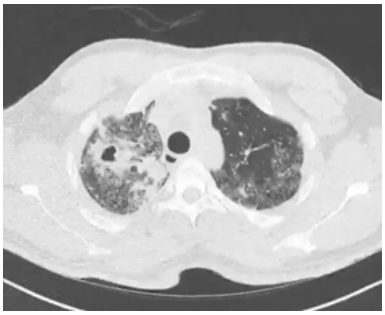

Image 1:

The imaging features are **highly suggestive of advanced pulmonary tuberculosis**, particularly with **cavitary lesions** in the left lung

DISCUSSION

The results of this study reaffirm the detrimental effects of smoking on the course and outcome of pulmonary TB. Smoking not only predisposes individuals to TB but also hinders bacterial clearance and symptom resolution. Nicotine and other toxic substances in tobacco suppress immune function, reduce nitric oxide levels, impair cytokine production, and promote inflammation, all of which contribute to TB pathogenesis. Several studies, including those by Rathee et al[10] and Khan AH et al[11], have similarly reported that smokers with TB tend to have more severe disease, slower sputum conversion, and higher default rates.

Our findings align with previous research: the high bacillary load, poor radiological outcomes, and persistent symptoms in smokers stress the need for aggressive intervention[12]. In addition to TB therapy, integrating tobacco cessation programs within TB care can be beneficial. National and global TB control efforts must address tobacco addiction to improve the efficacy of existing strategies[13].

CONCLUSION

Smoking significantly impairs the clinical, bacteriological, and radiological response to anti-TB therapy. Compared to non-smokers, smokers had delayed sputum conversion, persistent radiological abnormalities, and slower symptom relief. This study highlights the importance of incorporating smoking cessation strategies into TB treatment programs. Public health policies must address smoking as a modifiable risk factor to enhance TB control and reduce disease burden.

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