Journal of Advanced Research in Medicine
Volume 11, Issue 2 - 2024, Pg. No. 1-5
Peer Reviewed & Open Access Journal

Research Article

Evaluation of Socio-Demographic Determinants of Sputum-Positive Drug-Sensitive Pulmonary Tuberculosis Patients in a Hospital-Based Study

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DOI: https://doi.org/10.24321/2349.7181.202404

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How to cite this article:
Verma A K, Gupta A. Evaluation of Socio-Demographic Determinants of Sputum-Positive Drug-Sensitive Pulmonary Tuberculosis Patients in a Hospital-Based Study. J Adv Res Med 2024; 11(2): 1-5.

Date of Submission: 2024-04-29
Date of Acceptance: 2024-05-30

A B S T R A C T

Introduction: Tuberculosis has been affecting mankind for a long time and has been on the rise, especially in India, impacting it socially and economically.

Objective: To assess and evaluate demographic and social determinants in pulmonary tuberculosis patients visiting tertiary health care centre

Method: A study was conducted among 98 sputum-positive drug-sensitive pulmonary tuberculosis patients in the Department of Respiratory Medicine at the University College of Medical Sciences, Guru Teg Bahadur (GTB) Hospital wherein their demographic details were noted including age, gender and socio-economic status along with body mass index and smoking status. An evaluation was done to assess and compare various factors.

Results: In this study, 83.7% (82) of the patients were < 45 years of age. The majority were male [51% (50)] and 97% (95) belonged to lower socioeconomic classes. 54.1 % (53) of patients had BMI < 18.5 kg/m^2. Out of 82 patients who were < 45 years of age, 53.7% (44) had BMI < 18.5 kg/m^2. Out of 50 male patients, 46% (23) had BMI < 18.5 kg/m^2 while out of 48 female patients, 62.5% (30) had BMI < 18.5 kg/m^2. Out of 20 patients who had a history of smoking, 65% (13) patients had BMI < 18.5 kg/m^2 while out of 78 patients who didn't smoke cigarettes/ bidis, 69.3% (54) had BMI > 18.5 kg/m^2 and there was a statistically significant association. 69.2% (9) of the patients who had a smoking history of > 10 pack years had BMI < 18.5 kg/m^2.

Conclusion: Socio-demographic status, illiteracy, and poverty are potential dangers for tuberculosis and thus contribute to undernutrition and inadequate medical attention.

Keywords: Socio-Economic, Body Mass Index, Smoking

Introduction

Tuberculosis (TB) being one of the most infectious diseases is caused by Mycobacterium tuberculosis bacteria and it most commonly affects the lungs. The mode of transmission is through aerosol when patients cough, sneeze or spit. It is a preventable and curable disease but has a high morbidity and mortality rate if left untreated. [1]

TB exists in almost all countries and can affect every age group. There is an approximately 5–10% chance of developing symptoms and disease among the infected population. Globally, about a quarter of the population is estimated to have been infected with TB bacteria. Worldwide, TB incidence was estimated to be 10.6 million which included 5.8 million men, 3.5 million women and 1.3 million children. Mortality due to TB was about 1.3 million in 2022. TB is the second leading infectious killer after COVID-19 globally. As per the sustainable development goals, the health target of the United Nations is to end the TB epidemic by 2030.[1]

As per the report globally in 2022, the largest number of new TB cases occurred in WHO's South-East Asian Region (46%), followed by the African Region (23%) and the Western Pacific (18%). Around 87% of new TB cases occurred in the 30 high TB-burden countries, with more than two-thirds of the global total in Bangladesh, China, the Democratic Republic of the Congo, India, Indonesia, Nigeria, Pakistan and the Philippines.[1]

This study was conducted to evaluate the demographic and social data of sputum-positive drug-sensitive pulmonary tuberculosis patients visiting a tertiary care centre and assess the correlation between various factors.

Materials and Method

A prospective observational study was conducted among 98 sputum-positive drug-sensitive pulmonary tuberculosis patients in the Department of Respiratory Medicine at the University College of Medical Sciences, Guru Teg Bahadur (GTB) Hospital from September 1, 2021 to April 30, 2022.

Patient Inclusion Criteria

1. All sputum-positive drug-sensitive pulmonary tuberculosis patients of age > 12 years
2. All patients who gave informed written consent

Patient Exclusion Criteria

1. Not willing to participate
2. Extrapulmonary or drug-resistant tuberculosis

Methodology

98 drug-sensitive pulmonary tuberculosis diagnosed by sputum smear positive or detected by CBNAAT/ TRUNAAT were serially enrolled in the study from outpatient or indoor patients under the Department of Respiratory Medicine. The study was carried out after obtaining approval from the Institutional Human Ethics Committee. Informed consent was taken. Their demographic details were noted including age, gender and socio-economic status according to the modified Kuppuswamy scale.[2] Weight and height of the participants were noted according to standard techniques. Body mass index (BMI) was calculated and smoking status for each participant was noted. The factors were then compared for any correlation among the demographic profiles.

Statistical Analysis

SPSS version 21.0 software was used for statistical analysis of the data. The various demographic data and smoking status were expressed as frequencies and percentages. The data was expressed as mean or median for Continuous variables. The chi-square test was used to compare the data among groups for nominal categorical data. A significant difference was indicated by a p value of less than 0.05.

Results

In this study, out of 98 patients included, 83.7% (82) of the patients were < 45 years of age while 16.3% (16) were more than 45 years as shown in Table 1. The majority were male (51%, 50) and 97% (95) belonged to lower socioeconomic classes as per Table 2.

In this study, 54.1% (53) of patients had BMI < 18.5 kg/m^2. As shown in Table 3, out of 82 patients who were < 45 years of age, 53.7% (44) had BMI < 18.5 kg/m^2 and the association was statistically insignificant. Out of 50 male patients, 46% (23) had BMI < 18.5 kg/m^2 while out of 48 female patients, 62.5% (30) had BMI < 18.5 kg/m^2 according to Table 4. The association was not statistically significant.

As shown in Table 5, out of 20 patients who had a history of smoking, 65% (13) patients had BMI < 18.5 kg/m^2 while out of 78 patients who didn't smoke cigarette/ bidi, 69.3% (54) had BMI ≥ 18.5 kg/m^2 and there was a statistically significant association.

69.2% (9) of the patients who had a smoking history of ≥ 10 pack years had BMI < 18.5 kg/m^2 as shown in Table 6. The association was not statistically significant.

Table 1.Distribution of Patients among Different Age Groups

Age (Range in Years)	Frequency (N = 98)	Percentage
12–25	43	43.9
25–35	19	19.4
35–45	20	20.4
45–55	6	6.1
55–65	6	6.1
65–75	4	4.1
Total	98	100.0

Table 2.Distribution of Patients among Different Socio-Economic Categories

Socio-Economic Status	Frequency (N = 98)	Percentage
Lower	57	58.2
Upper lower	38	38.8

ISSN: 2349-7181
DOI: https://doi.org/10.24321/2349.7181.202404

Lower middle	2	2.0
Upper middle/ upper	1	1.0
Total	98	100.0

Table 3.Association between Body Mass Index with Ages of Patients

Age (Years)	Body Mass Index (kg/m²)		p Value
	< 18.5 n (%)	≥ 18.5 n (%)	
≤ 45	44 (53.7)	38 (46.3)	0.8490
> 45	9 (56.3)	7 (43.7)	

Table 4.Association between Body Mass Index with Gender of the Patients

Gender	Body mass index (kg/m²)		p Value
	< 18.5 n (%)	≥ 18.5 n (%)	
Male	23 (46.0)	27 (54.0)	0.101
Female	30 (62.5)	18 (37.5)	

Table 5.Association of Body Mass Index with Smoking Status of Patients

Smoking Status	Body Mass Index (kg/m²)		p Value
	< 18.5 n (%)	≥ 18.5 n (%)	
Yes	13 (65.0)	7 (35.0)	0.0048
No	24 (30.7)	54 (69.3)	

Table 6.Association of Pack Years of Smoking with Body Mass Index of Patients

Body Mass Index (kg/m²)	Smoking Pack Years		p Value
	< 10 n (%)	≥ 10 n (%)	
< 18.5	4 (30.8)	9 (69.2)	0.251
≥ 18.5	4 (57.2)	3 (42.8)	

Discussion

In India, pulmonary tuberculosis remains a significant public health concern, with the country accounting for a large proportion of the global burden of tuberculosis cases. Factors such as overcrowding, poor living conditions, limited access to healthcare services, and challenges in implementing effective tuberculosis control programs contribute to the high burden of the disease in India. Efforts have been made to improve early detection, diagnosis and treatment of tuberculosis, as well as to address social determinants of health that contribute to the spread of the disease. Despite these challenges, progress has been made in recent years, with increased awareness, improved diagnostics, and expanded access to treatment contributing to a decline in tuberculosis incidence rates.

Continued investment in tuberculosis control efforts, along with a focus on addressing social and economic disparities, will be crucial in further reducing the burden of pulmonary tuberculosis in India. Analysis of the socio-demographic profile of pulmonary tuberculosis patients plays a crucial role in understanding the factors that contribute to the prevalence and spread of the disease within different populations. By assessing socio-demographic data such as age, gender, socioeconomic status and living conditions of pulmonary tuberculosis patients, researchers can identify patterns and trends that may influence the risk of infection, access to healthcare services, treatment outcomes, and overall disease burden.

Understanding these socio-demographic factors can help public health officials and policymakers develop targeted interventions and strategies to effectively control the spread of tuberculosis, improve access to healthcare services, and reduce disparities in disease outcomes among different population groups.

This study was conducted to assess and evaluate social and demographic determinants which may play a pivotal role in understanding the patient's profile of drug-sensitive pulmonary tuberculosis and to analyse the factors which may help in planning the efforts required to curtail the burden of tuberculosis.

83.7% (82) of the patients were < 45 years of age in this study. Similarly, in a study done by Sumana et al. majority (69.1%) patients were from economically productive age groups between age 15–44 years.[3] Thus, TB mainly infects the productive age group which adversely affects the economy, thereby impacting their work status.

In this study, 51% (50) were males while 49% (48) were female. In the study done by Kundu SS, most (67.25%) of the patients were males while 32.75% were female.[4] These findings are in accordance with the assertion that TB is more prevalent among males than females.

97% (95) belonged to lower socioeconomic class in this study. Likewise, in the study conducted by Bhunia et al., they stated that more than 95% of the tuberculosis patients belonged to lower socioeconomic classes. Studies have shown that individuals from lower socioeconomic backgrounds or living in crowded and poorly ventilated environments are at higher risk of contracting tuberculosis. Factors such as lack of access to healthcare facilities, stigma associated with the disease, and limited awareness about prevention and treatment options can also impact the socio-demographic profile of pulmonary tuberculosis patients.[5]

In our study, 54.1 % (53) of patients had BMI < 18.5 kg/m2. Similarly, in the study done by Bhunia et al., 49.45% had a BMI of less than 18.5 kg/m2.5 Also in this study most of the males [54% (27)] had BMI ≥ 18.5 kg/m2 while most of the females 62.5% (30) had BMI < 18.5 kg/m2. Bhunia et al. also concluded in their study that 56.6% of male patients BMI ≥ 18.5 kg/m2 while 68.5% of female patients had had BMI

<18.5 kg/m2.5 It has been observed that socio-demographic status, poor literacy, and poverty are traditional dangers for tuberculosis, attributed to malnutrition and inadequate medical attention. Further undernutrition also predisposes to predilection of developing tuberculosis more commonly in females.[6]

There has been a statistically significant association (0.0048) among patients who had a history of smoking with low BMI in this study. Flegal et al. also stated in their study that cigarette smokers weigh less than non-smokers.[7] Piirtola et al. also concluded in their study that current smokers had lower BMIs than never-smokers.[8] 69.2% (9) patients with smoking pack year ≥ 10 had BMI < 18.5 kg/m^2 while 30.8% (4) patients with smoking pack year of < 10 had BMI < 18.5 kg/m^2.

It may be due to adverse metabolic effects of nicotine which also suppresses the appetite.[9] Smoking and nicotine have been associated with an increase in energy expenditure thus it further tends to lower the BMI.[10]

This study will be helpful for further understanding of socio-economic risk factors associated with the onset and progression of tuberculosis, and assessment of best intervention and effectiveness.

Conclusion

Understanding the socio-demographic profile of pulmonary tuberculosis patients is essential for forming evidence-based policies and interventions that aim to address the complex social, economic, and environmental factors that contribute to the burden of tuberculosis in communities.

Source of Funding: None

Conflict of Interest: None

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