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A DANGEROUS COMBINATION OF TOBACCO SMOKING AND PULMONARY TUBERCULOSIS

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Abstract

Background: Smokers are more likely to get TB infection because smoking weakens the immune system and harms the lungs. It has been demonstrated that the onset of TB is associated with altered immunological response and numerous immune cell abnormalities, including those in macrophages, monocytes, and CD4 lymphocytes. The WHO proposed a larger emphasis on preventing TB exposures in 2010. Smoking has been linked to an increased chance of developing tuberculosis (TB) in multiple studies, along with coronary heart disease and cancer. By 2020, it is anticipated that TB and tobacco-related deaths, both of which are significant causes of mortality and morbidity, will total 8.4 million.

Aim: A Dangerous Combination of Tobacco Smoking and Pulmonary Tuberculosis

Material and Method: The department of respiratory medicine was where the study was carried out. All individuals 10 years of age and older underwent a chest x-ray and symptoms examination to check for pulmonary tuberculosis. Sputum smear and culture examinations were used to assess those with chest symptoms and/or positive radiographs. About 5400 people were surveyed, and they served as the study's cases and controls. During the survey period, the illness status of the cases and controls was established, and at the time of the study in 1998, exposure to tobacco smoking was identified for both patients and controls.

Results: 34 of 50 cases (68%) and 38 of 50 controls (76%) were present, giving a total of 72 of the 100 individuals (72%) available for interview; subsequent analysis was confined only to these individuals because exposure data were collected only from them. Since all the study population came from the rural villages which were homogenous with respect to social and demographic characteristics, it is reasonable to assume that the remaining subjects did not differ sociodemographically from the population interviewed.

Conclusion: It's probable that smoking tobacco increases the risk of getting pulmonary tuberculosis. To quantify the incidence rate ratios between smokers and non-smokers and to increase the evidence for a causal link between tobacco use and pulmonary tuberculosis, additional studies employing various study designs and a follow-up time are required.

Keywords: Sociodemographically, Tobacco, Smoking and Pulmonary Tuberculosis

Introduction

The human race has been afflicted by tuberculosis (TB) for more than 4,000 years. It is a chronic illness that spreads from person to person through the air and is brought on by the bacteria Mycobacterium tuberculosis. Although TB often affects the lungs, it can also damage the brain, intestines, kidneys, or spine. The location of the TB germs in the body affects the TB symptoms. Pulmonary TB can manifest as symptoms including a persistent cough, chest

pain, hemoptysis, weakness or weariness, weight loss, fever, and night sweats.[1]

Bangladesh is one of the developing nations where TB is still one of the top causes of morbidity and mortality. It was anticipated that TB would decrease internationally with the development of chemotherapy in the 1940s and the adoption of the standardized short course in the 1980s. Although most developed countries showed a downward tendency, many developing nations did not show this. TB is the most common cause of mortality from a single source of infection among adults and accounts for around 7% of all fatalities in underdeveloped nations. The World Health Organization (WHO) has deemed it the first infectious disease to be a global health emergency. Globally, there were predicted to be 9.27 million incident cases of TB, 13.7 million prevalent cases, 1.32 million HIV-negative deaths from TB, and 0.45 million HIV-positive fatalities in 2007. 86% of all cases are found in just Asia and Africa. Among 22 nations with significant TB burdens, Bangladesh had the sixth-highest burden in 2007, with 353,000 new cases, 70,000 fatalities, and an incidence of 223/100,000 persons annually.[2]

Smokers are more likely to get TB infection because smoking weakens the immune system and harms the lungs. It has been demonstrated that the onset of TB is associated with altered immunological response and numerous immune cell abnormalities, including those in macrophages, monocytes, and CD4 lymphocytes.[3]

Worldwide, smoking and tuberculosis continue to be important health hazards. According to certain studies from China and India, smoking worsens the condition and raises the death rate of tuberculosis. The WHO proposed a larger emphasis on preventing TB exposures in 2010. Smoking has been linked to an increased chance of developing tuberculosis (TB) in multiple studies, along with coronary heart disease and cancer. By 2020, it is anticipated that TB and tobacco-related deaths, both of which are significant causes of mortality and morbidity, will total 8.4 million. Smokers experience more oxidative stress due to a number of elements in cigarette smoke, including free radicals of oxygen, acrolein, formaldehyde, and carbon monoxide. This affects the bronchial mucosa and increases the risk of contracting Mycobacterium tuberculosis infection. This could be the cause of less successful TB treatment outcomes in particular populations. The World Health Organization (WHO) ranked Malaysia as an intermediate burden country in 2018 despite the fact that the prevalence of TB in Malaysia has dramatically dropped compared to the early 1990s, with an incidence rate of 92/100,000 and an anticipated mortality rate of 4.9/100,000 people.[3]

There are only a few observational studies highlighting the association between smoking and TB treatment outcomes, with a small study population or single-center studies that are challenging to generalize, despite mounting evidence of a strong association between tobacco use and TB. Prior research has often revealed potential risk factors for TB treatment failure. This study looked at the smoking rates among TB patients in Malaysia and the effects that smoking may have on how well therapy for the disease works.[4]

Material and Method

The department of respiratory medicine was where the study was carried out. All individuals 10 years of age and older underwent a chest x-ray and symptoms examination to check for pulmonary tuberculosis. Sputum smear and culture examinations were used to assess those with chest symptoms and/or positive radiographs. About 5400 people were surveyed, and they served as the study's cases and controls. During the survey period, the illness status of the cases and controls was established, and at the time of the study in 1998, exposure to tobacco smoking was identified for both patients and controls. Men between the ages of 20 and 50 who had pulmonary tuberculosis on a positive sputum smear and/or culture were considered cases. The control group consisted of 20 to 50-year-old men who underwent

screening and were found to be tuberculosis-free.

Selection of Cases

All bacillary cases found in the nested population that met the definition requirements for a case as indicated above were included in the study; 82% of them had positive cultures and 18% had positive smear results.

Selection of Control

Five controls were chosen at random from among the non-cases in the same village for every case that was chosen from that village. The controls were placed in the neighborhood. For cases that occurred in a village, the entire village was regarded as the neighborhood. For instance, if a village had five cases, 25 controls were chosen at random from the non-cases aged 20 to 50 from the same village as neighbourhood controls, and none of the controls were matched to any of the cases.

Exposure to Tobacco

In India, smoking tobacco is a popular practice among men. Cigarettes and "beedi" smoking are the two types of tobacco use that are most common in the research population. Flaked tobacco is rolled in a rectangular piece of dried Tendu leaf (Diospyros exsculpta) to form "beedi". When smoked, the Tendu leaf has no flavor or smell. "Beedi" might emit less smoke than a cigarette due to its smaller size.

Statistical analysis

Odds ratios were calculated as an effect measurement. The Mantel-Hanszel method was used to adjust the crude odds ratio for age because it was determined that there was a substantial difference in the age distribution of the cases and controls. Using Epi Info 6 software, the test for linear trend was used to examine the dose-response relationship.

Results

Table 1: Distribution of Study Population by Census Status

Census Status	Cases	Controls	Total
Present	34	38	72
Absent	2	1	3
Left	5	4	9
Dead	7	6	13
Fate Unknown	2	1	3
Total	50	50	100

The status of the study population at the time of the interview in 1998 is shown in table 1. 34 of 50 cases (68%) and 38 of 50 controls (76%) were present, giving a total of 72 of the 100 individuals (72%) available for interview; subsequent analysis was confined only to these individuals because exposure data were collected only from them. Since all the study population came from the rural villages which were homogenous with respect to social and demographic characteristics, it is reasonable to assume that the remaining subjects did not differ sociodemographically from the population interviewed.

Table 2: Cumulative Effect of Smoking on Occurrence of Pulmonary Tuberculosis

	Smoking Duration (Yrs)			Non-Smoker
	<10	11-20	>20	
Cases	14	26	7	3
Controls	6	9	5	30
Odds Ratio	0.81	2.06	14.0	-

Table 4 shows the cumulative effect of smoking on the occurrence of pulmonary tuberculosis. Smokers were classified on the basis of duration of smoking into the following three categories: <10 years, 11–20 years, and >20 years. Odds ratios of 0.81, 2.06, and 14.00, respectively, were obtained for the three categories ($p<0.0017$).

Discussion

Men who live in both rural and urban areas of India frequently smoke tobacco, with urban areas typically having a higher prevalence than rural ones. Smoking "beedi" is more prevalent in rural regions than smoking cigarettes, mostly because it is less expensive.

This study's odds ratio and age-adjusted odds ratio are both statistically significant. This effect could be accidental, biased, or confounded, or it could be true. It has previously been established that there is very little likelihood that this odds ratio could have been discovered randomly. There was no bias in case selection because all of the survey's qualifying cases were chosen for the study.[5] A similar random selection process was used to choose the controls, providing each eligible non-case in the survey an equal chance of being chosen as a control. Thus, there was no bias in the choice of controls. There was no chance of the disease state of the study patients being incorrectly classified because the cases were chosen from the survey records. By keeping the interviewers unaware of the individuals' sickness status, observer bias was reduced. As tobacco smoking is common among men, the study subjects generally did not feel any reluctance or inhibition to discuss their smoking habits. If there was any responder bias in reporting their smoking status, only a smoker may have been mistaken for a non-smoker and not the other way around. The effect of smoking on tuberculosis may have been underestimated as a result of this misclassification; in other words, if this bias existed, the true effect would have been higher than calculated. There is little risk of recall bias because smoking is a well-known habit and both cases and controls would have little trouble remembering whether it was present or not. Because age could be a confounding factor, the crude odds ratio was aged. Only men between the ages of 20 and 50 were included in the study population to lessen the impact of other variables.[6]

Yu et al.[7] reported a relative risk for heavy smokers (>400 cigarettes/year) of 2.17 (95% CI 1.29 to 3.63) compared with non-smokers. They demonstrated using a binomial regression model that smoking was substantially responsible for the influence of age and sex on the risk of tuberculosis. Alcaide et al.6 reported an odds ratio of 3.8 (95% CI 1.5 to 9.8) for active smokers utilizing a case-control design and multiple logistic regression model for analysis of factors of interest. Additionally, they discovered a dose-response association between daily cigarette consumption and active pulmonary tuberculosis.

As a result, studies carried out in various parts of the world have utilized various study design types, case definitions, and analytical approaches to provide results that may point to a connection between tobacco use and pulmonary tuberculosis. The nicotine in cigarette smoking may interfere with the host's immunological response against Mycobacterium TB, even if the precise mechanism is unknown.

Conclusion

In conclusion, we have demonstrated that there is a dose-dependent connection between cigarette use and the development of pulmonary tuberculosis utilizing a case-control design and suitable analysis. It's probable that smoking tobacco increases the risk of getting pulmonary tuberculosis. To quantify the incidence rate ratios between smokers and non-smokers and to increase the evidence for a causal link between tobacco use and pulmonary tuberculosis, additional studies employing various study designs and a follow-up time are required.

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