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Impact of Smoking Over Sputum Smear Conversion in Pulmonary Tuberculosis Patients

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ABSTRACT

Smoking reduces mucociliary clearance and inhibits macrophage functions against bacteria. It is important to evaluate the impact of smoking over response to ATT. Hence, we have decided to conduct a prospective study which aims to assess and compare the rates of sputum conversion in smokers and non smokers. Total 200 patients (100 smokers and 100 non-smokers) with positive sputum status for AFB smear were enrolled in the study. After 2months of ATT, 46% smokers and 21% non smokers patients were still found to be sputum smear positive for AFB. This signifies that the effect of ATT delays conversion of sputum positivity in a patient with positive smoking history.

KEYWORDS

Introduction

Tobacco smoking is major contributor to respiratory diseases especially pulmonary tuberculosis1,2, as it reduces mucociliary clearance and inhibits macrophage functions against bacteria3. Variability in the response to therapy for pulmonary tuberculosis has been noted even in the individual with sensitivity to all the anti tubercular therapy (ATT). This variability depends on mycobacterial and host biological factors as well as host behavioral factors. Factors influencing sputum smear conversion have been studied extensively, but the effect of smoking has not been evaluated well4,5. Sputum smear conversion to negative after first 2-3 months of treatment is widely used measure of bacteriologic response to ATT trials6. Hence, we decided to further evaluate the impact of smoking over response to ATT.

Aims and Objectives

The main objective of the study is to assess and compare the rates of sputum conversion (from sputum positive to sputum negative) after intensive phase of 2 months in smokers and non smokers sputum positive pulmonary tuberculosis patients receiving DOTS category I as per Revised National Tuberculosis Control Programme (RNTCP).

Material and Methods

A prospective study was carried out in the Pulmonary Medicine department of Rohilkhand Medical College and Hospital. Freshly diagnosed sputum positive pulmonary tuberculosis cases (as per RNTCP labs) from age above 14 years of both genders after separating them into smokers (>1 pack/year) and non smokers during the period of 2 years (January 2014 to December 2015) were included in the study. History of diabetes, drug abuse, alcoholism, hematologic parameters, renal function tests and hepatic function tests were entered in a Performa. All these patients were given chemotherapy (DOTS CAT I) as per RNTCP. The sputum examinations were repeated after 2 months of intensive phase. Drug resistant cases were ruled out by sending their sputum sample for CBNAAT in the District Hospital, Bareilly as per PMDT guidelines. The patients with HIV positive status, diabetes mellitus, presenting malignancies, steroid toxicity, toxicity to anti tubercular drugs, drug abuse, alcoholics and patients with irregular treatment were excluded from the study.

Results

Total 200 patients with sputum positive status for AFB by smear in 2 year time period, after fulfilling inclusion and exclusion criteria were enrolled in the study. Out of which, 100 patients were smokers and 100 patients were non smokers. Mean age of smokers and non smokers were 51.26 ± 11.53 and 48.9 ± 12.7 years respectively. Male and female ratio was 4.6 and 3.8 in smokers and non-smokers (Table 1).

Table 1: Demographic Characteristics of patients

Variable	Smokers (n=100)	Non Smokers(n=100)
Mean age (in years)	51.26±11.53	48.9±12.7
Gender (male/female) Male : Female	82/18 4.6	79/21 3.8

As stated in Table 2, an equal distribution of 100 patients was noted among smoker and non smoker. All of them were sputum smear positive for AFB at the beginning of treatment. After administration of 2 months of ATT, 46% patients among smokers and 21% among non smokers were still found to be sputum smear positive for AFB.

Table 2: Sputum smear positivity after 2 months of therapy

Groups	Sputum Smear Positivity	
	At initiation of therapy	After 2 months of therapy
Smokers (n=100)	100(100%)	46(46%)
Non Smokers (n=100)	100(100%)	21(21%)

Keeping in mind the influence of disease factor like : initial bacillary load and the chemotherapy regimen on sputum conversion were also analyzed in relation to smoking history. Only

63% of the smokers, where as 97% of non smokers with 3+ sputum status converted to a negative smear giving a significant association.

Discussion

Various factors like diet, rest, climate and accommodation have no influence to the treatment of tuberculosis, it depends mainly on adequate chemotherapy and severity of the disease8. Sputum conversion after 2 months of treatment (intensive phase) is a surrogate measure to know the response to anti tuberculosis treatment in India. Further delay from 2 months of sputum conversion is associated with treatment failure and relapse9. In our study, we observed that patients who smoked, had nearly twice greater chances for delayed conversions. Approximately same observations were observed by Maciel EL et al10, Batista et al11, Shprykov AS and Zhadnov VZ12. In contrast to our observation, Abal AT et al13 and Singla R et al14 stated that smoking did not affect smear conversion during treatment.

Rapid killing of tubercle bacilli is important for effective treatment and reduced risk of infecting others in the community14. Smoking delays killing of these tubercle bacilli hence increasing ineffectiveness of treatment and increase risk of spreading infection.

Conclusion

Effect of ATT was significantly better in non-smoker when compared to smokers. Delayed sputum conversion in smokers, have a significant community burden by spreading the disease for a longer duration of time despite successful initiation of therapy.

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