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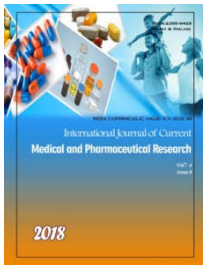

INCIDENCE OF SPUTUM SMEAR POSITIVE PULMONARY TUBERCULOSIS AT A TERTIARY CARE CENTRE IN NORTH INDIA

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ABSTRACT

Introduction: Tuberculosis is an age old disease, considered to have its origin some 70,000 years ago in Africa, but still continues to haunt the society, being a very common cause of morbidity and mortality all over the world. Recent years have seen a rise of incidence of this disease predominantly due to the HIV epidemic. Epidemiological data on the disease is important for planning control strategies. Current diagnosis of the disease rests on sputum smear microscopy which is also convenient in a resource poor country like India.

Materials and Methods: The present study was done to estimate the incidence of pulmonary tuberculosis in a tertiary care centre in India. It is a cross sectional study conducted at ASCOMS & Hospital, Jammu which caters to the local population. All patients from Medicine OPD in the study period (January 2017 to December 2017) who had symptoms and other features suggestive of pulmonary tuberculosis were subjected to two sputum examination for AFB microscopy by Ziehl Neelsen staining method conducted in the DOTS center/DMC of the hospital. Demographic data of study subjects was recorded using pre-formed questionnaires and analyzed using appropriate tools.

Results: A total of 639 patients participated in the study. Total sputum samples collected were 1269 out of which 136 were positive giving slide positivity rate of 10.7%. Among all of the total positive slides, male female ratio was 1.85:1. Maximum number of slide positive cases was present in elderly age group in both male and female. 16.22% cases observed had one of the two sputum samples as positive.

Conclusion: The findings of this study reveal that elderly (>60 years) were most susceptible to tuberculosis and also percentage positivity of sputum among females was found almost similar to males in the reproductive age group (21-50 year). This study emphasizes the importance of at least two sputum samples for diagnosis of pulmonary tuberculosis. Our study also highlighted the lower infectivity from HIV-infected group compared to general population.

INTRODUCTION

Tuberculosis is one of the oldest diseases known to affect humans, and the ninth leading cause of death worldwide .If properly treated it is curable in vast majority of cases , while in untreated cases, it may be fatal within five years of diagnosis[1,2]. It is estimated that worldwide, around 10.4 million people became infected with tuberculosis in 2016, with most number of cases occurring in South-East Asian Region (~45%). There were 4,76,774 reported cases of HIV-positive tuberculosis (46% of the estimated incidence) [2]. About 85% of deaths occurred in Africa and South East Asian Region. Globally, an estimated 4.1% of new cases and 19% of previously treated cases had MDR/RR-TB (Multi Drug Resistance/Rifampicin Resistance) [2]. During the late 1980s and early 1990s, number of reported cases of tuberculosis increased, primarily due to spread of HIV epidemic and social problems like increased urban poverty, homelessness, and drug abuse. Of the estimated number of cases, almost 13 % were associated with HIV infection, and 78% of these HIV-associated cases occurred in Africa. An estimated 0.36 million people with HIV-associated tuberculosis died in 2013[1]. HIV is also the most potent risk factor for activation of tuberculosis in those infected with the microbe, as it suppresses the cellular immunity. In a study of HIV-infected patients, the risk of disease from infection (assessed by tuberculin skin test/TST) varied from 2.6 to 13.3 cases /100 person-years and increased as the CD4+ T cell count decreased[1]. India accounts for ~26% of disease burden and deaths, with a huge share among those with MDR (Multi Drug Resistance) and XDR-TB (Extensive Drug Resistance), and lately cases resistant to all anti-tubercular drugs have been reported in the country[2, 3,4]. In general, adults ≥65 years of age have the highest incidence rate per capita (4.9 cases/100,000 population in 2013), and children <14 years of age the lowest (0.8 case/100,000 population)[1]. Pulmonary Tuberculosis is the predominant form of disease, with lymph node, pleural, genitourinary, skeletal, meningeal, gastrointestinal, and pericardial being common extra

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pulmonary forms[1]. Several studies have reported a male dominance in pulmonary tuberculosis, with the ratio varying from 5:1 to 2:1 in majority of those. At present, sputum analysis for acid fast bacilli (AFB) is the mainstay of diagnosis of active pulmonary tubercosis[5], which although inexpensive, has relatively low sensitivity (40-60%) [1]. Recently, the WHO has changed its policy from spot morning spot (SMS) to spot morning (SM) sputum smears (which requires two samples instead of three for AFB examination) for the diagnosis of Pulmonary Tuberculosis[6]. In the current case definitions recommended by WHO, one positive result is required for a diagnosis of smear-positive pulmonary TB[2]. The aim of this study is to find out the Incidence of sputum smear positivity in patients with pulmonary tuberculosis, in a tertiary care hospital.

MATERIALS AND METHODS

Our study was carried out in ASCOMS & Hospital Jammu, J&K, which is a premier tertiary institute of the state and has a DOTS Centre/DMC (Designated Microscopy Centre) allocated to it. The study was approved by the Institute's Ethical Committee and included all new symptomatic patients presenting to Medicine OPD and Emergency between 1st January 2017 to 31st December 2017.Symptoms and signs that were included for enrollment into the study were (1) fever for two weeks or more, (2) persistent cough for two or more weeks, (3) hemoptysis, (4) constitutional symptoms like significant weight loss, loss of appetite, night sweats , (5) significant unexplained lymphadenopathy, (6) any radiological abnormality consistent with the disease. Two sputum samples of each patient presenting with any of the above complaint were examined for Acid fast bacilli (AFB) microscopy using Ziehl-Neelsen staining and graded according to RNTCP guidelines. In addition patients diagnosed with a positive sputum were assessed for HIV status (due to the latter being a common co-existent factor and the most potent risk factor for disease activation in latent individuals). Patient's information was collected using a standard data collection form in which various demographic data like patient's name, age, sex, locality, any significant past, and family or treatment history was recorded. Patients with at least one smear positive for AFB were registered as smear positive tuberculosis. Smears were also graded as per the RNTCP guidelines[7]. External Quality Assurance (EQA) of sputum smear microscopy by Random Blinded Rechecking of slides (RBRC) and Onsite evaluation of microscopy centre was implemented during the study as per RNTCP guidelines. Data processing and statistical analysis were done using the SPSS (Statistical Package for the Social Sciences) software.

RESULTS

A total of 660 patients were enrolled in the study. Of them, two sputum samples were submitted by 630 patients (95%).9 patients submitted only one sputum sample which turned out to be strongly positive (2+ or more). Hence 639 patients were considered in the final study and the rest 21 were excluded (either did not submit any sample or only one sample was submitted, which was negative). A total of 400 males and 239 females comprised the study group (age and sex wise distribution of the study group in depicted in Table-1). Among the suspected patients, 74 were found to have a positive sputum for AFB (11.58 %). Of the total 1269 slides examined, 136 were positive for AFB, giving a slide positivity rate of 10.7%. In 62 patients, both sputum samples were found to be positive (83.78%) for AFB (Sputum smear positivity and patterns of smear positivity are depicted in tables 2 and 3). Maximum number of slide positive cases were in the elderly age group (>60 years). Of the total positive patients, 48 were male and 26 female, with a Male to female ratio of 1.85:1. In the reproductive age group (15 to 50 years), the ratio was 1.73:1. An interesting finding was the higher incidence in females of age group 21-50 years compared to males, which despite being non-significant in our study (as depicted in Table 4) could influence the importance of disease in females of child-bearing age. All the positive patients were subjected to HIV testing among whom 9 turned out to be positive for the same (12.16%). 6 of these patients had a smear grading of 1+(66.67%), suggesting low infectivity due to immunosuppression (Table 5).

Table 1 Age and sex wise distribution of the study patients

Age group	Males	Females	Total
15-20 y	30	19	49
21-30 y	61	37	98
31-40 y	71	38	109
41-50 y	68	36	104
51-60 y	70	42	112
>60 y	100	67	167
Total	400	239	639

Table 2 Sputum smear positivity in samples analyzed

Smear Positivity	Patients	Percentage
Both Positive	62	83.78%
Only first positive	10	13.51%
Only second positive	2	02.71%
Total	74	100%

Table 3 Pattern of smear positivity in samples analyzed

Pattern of smear positivity[7]	Patients
Scanty(1-9 AFB in 100 fields)	10
1+ (10-99 AFB in 100 fields)	15
2+ (1-10 AFB per field)	32
3+ (>10 AFB per field)	17
Total	74

Table 4 Smear Positivity in different age groups among males and females

Age group	Males Tested	Males positive	Females Tested	Females positive	Total	p value
15-20 y	30	02(06.67%)	19	01(05.26%)	03	0.68
21-30 y	61	07(11.47%)	37	05(13.51%)	11	0.76
31-40 y	71	08(11.26%)	38	05(13.16%)	13	0.77
41-50 y	68	09(13.23%)	36	05(13.89%)	14	0.92
51-60 y	70	07(10.00%)	42	03(07.14%)	11	0.60
>60 y	100	15(15.00%)	67	07(10.45%)	22	0.73
Total	400	48	239	26	74	

Table 5 Pattern of smear positivity in HIV infected patients

Pattern of smear positivity[7]	Patients
Scanty(1-9 AFB in 100 fields)	1
1+ (10-99 AFB in 100 fields)	6
2+ (1-10 AFB per field)	2
3+ (>10 AFB per field)	0
Total	9

DISCUSSION

Tuberculosis, which is caused by bacteria of the Mycobacterium tuberculosis complex, is one of the oldest diseases known to affect humans, and a major cause of death worldwide. Mycobacteria belong to the family Mycobacteriaceae also containing other organisms. Mycobacterium tuberculosis is a rod-shaped, non-spore-forming, thin aerobic bacterium, resistant to discoloration by

acid alcohol (hence the name Acid-fast bacilli).Acid fastness is due to high content of mycolic acids, and other cell-wall lipids. In countries with low socio-economic status (like India), sputum smear examination for AFB is the primary method for diagnosis of pulmonary tuberculosis. It is a simple, rapid, and cheap method, and also helps in identifying the most infectious patients. As per the literature, the highest incidence of the disease is found in adults≥ 65 years of age[1]. In our study, the incidence of sputum smear positivity was found to be 74 out of 639 (11.58 %). Age wise distribution demonstrated that elderly (>60 years) were the most common affected age group, accounting for 29.73 % of all cases. Studies done previously have a divided opinion in this respected with some like carried out by QH Khan observing the similar finding as ours[8], while others done by Gupta *et al*[9] concluding that the maximum incidence was seen in the reproductive age group. Several studies have demonstrated a male predominance among those affected by the disease[10, 11, 12], probably due to more exposure to outside world compared to females, and hence more chances of acquiring the infection. Similar finding was observed in our study with a male to female ratio of 1.85:1.An important observation we made was the almost similar percentage positivity of sputum among males and females in the reproductive age group (15 to 50 years), highlighting the importance of disease and its possible impact on the reproductive health of women. It also stresses upon the need to increase healthcare access to women who may not report symptoms and signs of disease due to socio-economic and cultural factors, especially in out set-up. Because persons with both HIV infection and tuberculosis are less likely to have cavitations, they may be less infectious than persons without HIV co-infection[1].Similar finding was observed in our study, with 2/3rd of HIV-positive patients with a positive sputum having a positivity grading[7] of 1+. The number of sputum specimens required to make the diagnosis of the disease has also been a matter of debate[13]. Recently, the WHO has changed its policy from spot morning spot (SMS) to spot morning (SM) sputum smears (which requires two samples instead of three for AFB examination) for the diagnosis of Pulmonary Tuberculosis[6].In our study, 12 patients had one sample positive for AFB (16.22%), emphasizing the importance of two sample protocol. In our study also, 21 patients (3.18%) were excluded because they submit only a single sample (which turned out to be negative) or did not submit any. This is a serious limitation of serial sputum smear microscopy. Some recent studies have compared the Spot morning protocol with a 1-day protocol (two samples collected on same day) in order to improve the compliance and decrease the number of diagnostic defaulters [14, 15] with positive results. However, such studies are currently subjected to debate. There are some limitations of our study, as it is a hospital based study and may not represent the true depth of disease in the community. Also our sample size was small probably due to lack of awareness regarding the signs and symptoms of the disease in the community.

CONCLUSIONS

The findings of this study revealed that the elderly population (>60 years) has higher incidence of tuberculosis in our area, with males dominating the picture, although the percentage positivity of sputum among females in the reproductive age group(21-50 year) was found almost similar to that of males. This was statistically non-significant, but may signal the impact of disease on the reproductive health of women. This study emphasizes the importance of at least two sputum samples for diagnosis of pulmonary tuberculosis as a significant proportion of patients had only one sample positive for the disease. Our study also highlights the lower chances of acquiring pulmonary tuberculosis from HIV-infected patients compared to general population which is consistent with the traditional findings.

References

1. Mario C. Raviglione. Tuberculosis. Harrison's Principles of Internal Medicine, 19th edition, Volume 2, 1102.
2. TB disease burden. WHO Global Tuberculosis Report 2017, 2-21.
3. Gupta, C., Kumar, V., Goyal, V., Goel, S., Singh, A., & Agrawal, Y. (2016). Clinico-pathological profile of tuberculosis of the head and neck region from a tertiary care teaching hospital. *Sch. J. App.Med. Sci., 4*(9B), 3285-3289.
4. Veerabhadrappa, P. S., Tank, P., Singh, A., Goyal, V., Goel, S., & Tank, R. (2016). Profile, Pattern and Surgical Management of Intestinal Tuberculosis from Western Uttar Pradesh. *Sch. J.App. Med. Sci., 4*(10C), 3764-3767.
5. Desikan, P. (2013). Sputum smear microscopy in tuberculosis: Is it still relevant? Indian J Med Res, 137, 442-44.
6. World Health Organization. Global tuberculosis control: WHO Report 2010. Geneva, Switzerland.
7. Sanjay Rajpal, V.K. Dhingra and J.K. Aggarwal (2002). Sputum grading as predictor of treatment outcome in pulmonary tuberculosis. Ind. J Tub., 2002,49, 139
8. Khan, Q. (2006). Epidemiology of pulmonary tuberculosis in rural Aligarh. *Indian J CommunityMed, 31*, 39-40.
9. Gupta, S. S., Shenoy, V. P., Mukhopadhyay, C., Bairy, I., & Muralidharan, S. (2011). Role of risk factors and socio-economic status in pulmonary tuberculosis: a search for the root cause in patients in a tertiary care hospital, South India. *Trop MedInt Health, 16*, 74-8.
10. Pol, A. B., & Bandaru, S. (2014). Socio demographic profile of new sputum smear positive tuberculosis patients in tuberculosis unit Khammam. *Int J Res Health Sci, 2*, 427-32.
11. Sunderam, S. K., Kumari, S., Haider, S., Kashyap, V., & Singh, S. (2015). A study on socio demographic profile of patients having cough of two weeks or, more along with their smear microscopy outcome attending a Tertiary Care Hospital of Jharkhand, India. *Int J ofInterdisciplinary and Multidisciplinary Studies, 2,*119-27.
12. Shah, Z. D., Deshmukh, A., Jadhav, S., Deshmukh, H., & Kasat, S. (2014). Prevalence of Sputum Smear Positive for Acid Fast Bacilli in Urban and Rural Population with Cough More than 3 Weeks in a Tertiary Care Centre. *Int J of Current MedicalAnd Applied Sciences, 2,* 6-9.
13. Hamid, S. H., Hussain, S. A., & Ali, I. (2012).Screening tuberculosis suspects: How many sputum specimens are adequate? *Annals of Tropical Medicine & Public Health, 5,* 317-20.
14. Davis, J. L., Cattamanchi, A., Cuevas, L. E., Hopewell, P. C., & Steingart, K. R. (2013). Diagnostic

accuracy of same-day microscopy versus standard microscopy for pulmonary tuberculosis: A systematic review and metaanalysis. *Lancet Infect Dis, 13*, 147-54.

15. Rawat, J., Biswas, D., Sindhwani, G., & Masih, V. (2010). An alternative 1-day smear microscopy protocol for the diagnosis of pulmonary tuberculosis. *Respirology, 15*, 1127–30.

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