Status of Tuberculosis in West Uttar Pradesh

Anurag Tewari[1], Ajab Singh Choudhary[2] and A.K. Upadhyay[3]*

[1] *Department of Agriculture, School of Sciences, Noida International University, Uttar Pradesh, India*

[2] *Department of Microbiology, Santosh Medical College, Uttar Pradesh, India*

[3] *Department of Public Health and Epidemiology, G. B. Pant University of Agriculture and Technology, Pantnagar, India*

Corresponding e-mail: ajay.akup@gmail.com

ABSTRACT

Patients with clinically suspected tuberculosis infection attending OPD/IPD and DOTs center at Santosh Medical College/Hospital, Ghaziabad Uttar Pradesh were studied. The numbers of male patients were 105 (70%) and female patients were 45 (30%). About 16 (10.3 %) smears were positive for acid-fast bacilli (AFB). All the 150 samples were decontaminated by modified Petroff's method and cultured on Lowenstein Jensen (LJ) media. Our result showed that the entire 16 (10.3%) sample which was smearing positive were also culture positive. Of the 134 samples which were smeared negative 5(3.3%) samples were culture negative. All the 21 isolated strains were confirmed by standard biochemical tests. On the basis of biochemical reactions, 7 were humans' type mycobacterium.

Keywords: Tuberculosis, WHO, Infections agent, Tuberculosis infection

INTRODUCTION

Tuberculosis is the major public health problem. In 1993, the World Health Organization (WHO) in an unprecedented step declared tuberculosis a global emergency. The fact sheet of global tuberculosis is stunning. World Health Organization emphasized both the large death toll from tuberculosis, which killed more people than any other single infectious agent and the curability of the disease [1].

The World Health Organization South-East Asia Region, with an estimated 5 million prevalent and about 3.5 million incident cases of tuberculosis in 2010 carried about 40% of the global burden of the disease. About 5 of the 11 member states of the region are among the 22 TB high-burden countries in the world with India alone accounting for more than 25% of the world's incident cases [2]. In July 2011, national consultations to estimate the TB burden took place. According to TSEAR, 2012, revised estimated prevalence and incidence rates of all forms of tuberculosis were respectively, 256 and 185 per 100,000 populations in 2010. However, current WHO estimates for TB incidence, prevalence and mortality have not yet been officially approved by the Ministry of Health and Family Welfare, Government of India and should, therefore, be considered provisional. The notification rate of all forms of TB and new smear-positive cases were respectively 109 and 51 in 20103. Therefore, the study was conducted to directly detect the *Mycobacterium tuberculosis* complex in the smear negative as well as smear positive samples.

PATIENTS AND METHODS

A cross-sectional, descriptive study was conducted with a sample size of 150 at the Department of Microbiology, Santosh Medical College, Ghaziabad, Uttar Pradesh, India from January 2017 to December 2017. Total 4 groups were formed, one with patients having a chronic cough for more than 2 weeks, second patients having fever for more than 2 weeks, third patients having cough with or without sputum and fourth with other sign and symptoms of tuberculosis. Sputum sample for smear and culture were collected as per the RNTCP guideline. Two sputum samples of 5 ml quantity were collected directly into the sterile container (Spot-Morning) as per national standard protocol. All sputum specimens submitted to the tuberculosis cultures were subjected to a harsh digestion and decontamination procedure

that liquefies the organic debris and eliminates contaminants. Thereafter, the smear was prepared and examined for the presence of *M. tuberculosis*. Positive cultures with typical colonies as rough, buff, tough, non-pigmented (cream colored) and slow-growers were confirmed by Ziehl and Neelsen, by the niacin and catalase test [3].

RESULTS

A total of 150 cases of clinically suspected tuberculosis infection attending OPD/IPD and DOTs center at Santosh Medical College/Hospital, Ghaziabad Uttar Pradesh were studied. The numbers of male patients were 105 (70%) and female patients were 45 (30%). Table 1 shows that the averages mean age of the male patients were 38.15 years and the 39.77 years for female's patients. Around 43.3% of the total patients had chest pain and 36.7% had an infection by contact with the infected person followed by hemoptysis (13.3%). The patients also showed loss of appetite (51.5%).

Table 1 Clinical profile of patients

Demographic/ Clinical features	No (%)
Total No of suspects	150
Sex	
Male patients	105 (70%)
Female patients	45 (30%)
Mean age	
Male patients	38.15 years
Female patients	39.77 years
Cough	
>2 weeks	130 (86.7%)
<2 weeks	20 (13.3%)
Fever	
>2 weeks	110 (73.3%)
<2 weeks	40 (26.7%)
Chest pain	65 (43.3%)
Breathlessness	80 (53.3%)
Hemoptysis	20 (13.3%)
History of contact	55 (36.7%)
Loss of appetite	100 (66.6%)
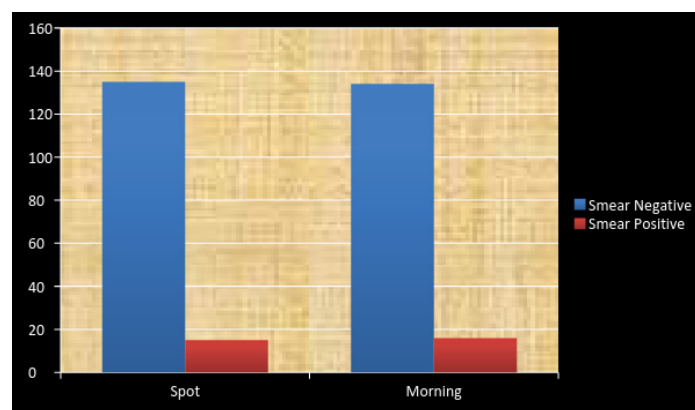
Figure 1 Graph showing a comparison between spot and morning sample

Out of 150 samples, 16 (10.3%) smears were positive for acid-fast bacilli (AFB). In spot sample examination, 15 (10%) were smear positive while on the other hand, in the morning samples, 16 (10.3%) were smear positive. The samples positive for smear collected at the spot were also positive for the sample collected early in the morning. The isolation rate of *M. tuberculosis* was more (10.3%) in morning samples as compared to spot (7%). Majority of a patient who was positive only in the morning sample had sputum smear grade as scanty, 1+ and 3+ (Table 2).

Table 2 Z.N. smear microscopy results with grading

Sample		Smear-positive	Smear-negative	Scanty	Smear grading sputum positive		
					1+	2+	3+
Z. N. Staining	Spot (150)	15 (10.0%)	135 (90.0%)	-	4 (26.7%)	6 (40.0%)	5 (33.3%)
	Morning (150)	16 (10.3%)	134 (89.7%)	1 (6.2%)	5 (31.2%)	4 (25.0%)	6 (37.5%)

All the 150 samples were decontaminated by modified Petroff's method and cultured on Lowenstein Jensen (LJ) media. Our result showed that the entire 16 (10.3%) sample which was smearing positive were also culture positive. Of the 134 samples which were smeared negative 5 (3.3%) samples were culture positive. All the 21 isolated strains were confirmed by standard biochemical tests. On the basis of biochemical reactions, 7 strains were humans' type *Mycobacterium tuberculosis* and 3 strains were non-tuberculosis mycobacterium (Table 3).

Table 3 Comparison of Z.N. smear positivity and culture

Sample	Culture		
	Positive	Negative	Total
ZN Smear	16 (10.3%)	NIL	16 (10.3%)
	05 (3.3.0%)	129 (86.0%)	134 (89.3%)
Total	21 (14.0%)	129 (86.0%)	150 (100.0%)

DISCUSSION

Among the communicable diseases, tuberculosis (TB) is the second leading cause of death worldwide, killing nearly 2 million people each year. It is estimated that about one-third of the world population is infected with TB (2 billion people) and about 10% of this figure will progress to disease state, most cases are in the underdeveloped countries of the world [3].

In the present study, the clinical history of the patients showed that a number of male patients 105 (70%) was higher as compared to that of female patients 45 (30%). The global data on tuberculosis prevalence has shown that the prevalence of *M. tuberculosis* is similar in males and females until adolescence, but after that, it appears higher in males [4]. Several studies have explored reasons behind the gender bias in tuberculosis susceptibility and found that fear and stigma associated with TB makes a greater impact on women than on men [5]. The male-female ratio for TB suspects may nevertheless reflect gender-related barrier in the access to TB services or suggested by other research and anecdotal evidence [4].

Our result showed that 86.7% of patient had coughed for more than two weeks. An earlier study done in 2002 in a different setting showed a 47% increase in sputum positive cases among chest symptomatic with >2 weeks a cough [6]. Also, most of the patients showed chest pain and loss of appetite followed by hemoptysis and a history of contact.

In the present study, the smear-positive rate was approximately higher for men than for women suggesting that the sex differences reflect biological phenomena rather than lower access to TB diagnosis for women. These may include not only true differences in TB incidence but also differences in the bacillary load of sputum specimen and thereby in the sensitivity of smear examination [6].

For developing countries, the smear microscopy to detect acid-fast bacilli (AFB) in clinical specimens by Z.N. staining is likely to remain the only cost-effective tool for diagnosing patients with TB and to monitor the progress of treatment. The overall sensitivity of the smear has been reported to range from 22% to 80%. An important factor influencing sensitivity is the minimum amount of sputum submitted to the laboratory. In a long-term study, the sensitivity of a concentrated smear from >5 ml of sputum was significantly greater than the sensitivity of a smear processed regardless of volume [6].

CONCLUSION

TB is preventable and curable, but it can lead to death if no actions are taken. In order to prevent transmission, it is necessary to identify infectious TB patients in a timely manner. Suspected TB persons with a persistent cough and expectoration lasting more than two weeks, need to be diagnosed promptly. Identification of subjects with latent tuberculosis infection is also necessary since dormant bacilli can be reactivated and cause disease, especially in HIV

patients. Another measure to prevent infection is the vaccination of newborn, unexposed children. Early diagnosis plays a vital role in the control of tuberculosis. Diagnosis of mycobacteria infections, however, remains an enigma. Although acid-fast bacilli microscopy and conventional Lowenstein Jensen culture remain the cornerstone of the diagnosis of tuberculosis, these traditional bacteriological methods are either slow or their sensitivity is quite low especially with clinical samples that contain a small number of the organism. This can affect treatment by either delaying it or causing inappropriate empiric therapy for tuberculosis to subjects without mycobacterial infections or with typical mycobacteria.

DECLARATIONS

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

[1] World Health Organization. Treatment of tuberculosis. Guidelines. Geneva, Switzerland, 2016.

[2] World Health Organization. Tuberculosis in the south East Asia Region (TSEAR). The regional report 2012, India, pp. 68.

[3] World Health Organization. Tuberculosis in the South-East Asia Region-The Regional Report 2008. No. SEA-TB-302. WHO Regional Office for South-East Asia, 2008.

[4] Lienhardt, Christian, Andrew Vernon, and Mario C. Raviglione. "New drugs and new regimens for the treatment of tuberculosis: a review of the drug development pipeline and implications for national programmes." *Current Opinion in Pulmonary Medicine,* Vol. 16, No. 3, 2010, pp. 186-93.

[5] Grosset, Jacques. "Bacteriologic basis of short-course chemotherapy for tuberculosis." *Clinics in Chest Medicine,* Vol. 1, No. 2, 1980, pp. 231-41.

[6] Zhang, Ying. "Genetics of drug resistance in Mycobacterium tuberculosis." *Molecular Genetics of Mycobacteria,* 2016.