

Original Research Article

Sputum positivity status for acid fast bacilli in patient attending a designated microscopy centre of a tertiary care hospital, Lucknow

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ABSTRACT

Background: Tuberculosis is a contagious bacterial disease that is considered to be one of the deadliest diseases worldwide. It affects lungs and causes pulmonary TB. Today in India, every minute 3 to 4 people die of TB, more than 1000 die every day and more than 5 lakhs die every year. Demonstration of AFB in smear has a great important in control of TB, as smear positivity directly correlates with infectivity.

Methods: It was a cross-sectional study. It lasted over a period of 6 months (January to June). Samples were collected from patients attending TB and Chest OPD of IIMS&R Hospital and sent for AFB examination by Ziehl-Neelsen (ZN) microscopy at microbiology lab. Patients with symptom of cough lasting for more than 2 weeks were included.

Results: Out of 718 patient's samples, 128 were smear positive by ZN staining method. Out of which 81 (63.28%) were males and 47 (36.72%) were females. According to age distribution 35 (27.35%) were <30 years of age, 68 (53.12%) were in between 30 and 60 while 25 (19.53%) were >60 years of age. 105 (82.03%) positive patients were found to be from rural area and remaining 23 (17.9%) patients belong to urban area. 29 patients were found to have a past history of TB of 1 year. Out of 128 positive patients none were smokers. 25 (19.53%) were tobacco chewers. 11 (8.56%) were contact with a case of TB.

Conclusions: Demonstration of AFB in smear has a great important in control of TB, as smear positivity directly correlates with infectivity. Z-N staining method is the most commonly used worldwide.

Keywords: AFB smear-positive sputum, *Mycobacterium tuberculosis*, Ziehl-Neelsen stain

INTRODUCTION

Tuberculosis (TB) is a contagious bacterial disease that is considered to be one of the deadliest diseases worldwide. It affects lungs and causes pulmonary TB. Today in India, every minute 3 to 4 people die of TB, more than 1000 die every day and more than 5 lakhs die every year.

TB is no longer considered as incurable disease. Men are more commonly affected than women. The case notifications in most countries are higher in males than in females. There were 1.4 million smear-positive TB cases in men and 775,000 in women in 2004.¹ The ratio of female to male TB cases notified globally is 0.47:0.67.²

TB occurs more frequently among low-income people living in overcrowded areas and persons with little schooling.³ Poverty may result in poor nutrition which may be associated with alterations in immune function. On the other hand, poverty resulting in overcrowded living conditions, poor ventilation, and poor hygiene-habits is likely to increase the risk of transmission of TB. Further research is warranted to improve diagnostics, develop new drugs and vaccines, simple and effective regimen for simultaneous treatment of TB and HIV, ways to improve programme effectiveness, and better understanding of the relationship between TB and chronic diseases, e.g. diabetes and smoking, and identify social and behavioural factors which limit the detection of

cases.^{1,5} Main source of infection is untreated smear-positive pulmonary tuberculosis patients.^{6,8} It remains as one of the top major public health problems worldwide and leading cause of mortality among people living with HIV/AIDS.

Based on the 2016 WHO report, there were 10.4 million new TB cases globally in 2015: 5.9 million (56%) men, 3.5 million (34%) women and 1.0 million (10%) children. India, Indonesia, China, Nigeria, Pakistan and South Africa accounted 60% of world's TB. Similarly, there were an estimated 1.4 million TB deaths among HIV negative people and an additional 0.4 million deaths from people living with HIV/AIDS.⁷ Creating awareness about TB, its causes, signs and symptoms, helps to detect and prevent the occurrence of TB. Demonstration of AFB in smear has a great important in control of TB, as smear positivity directly correlates with infectivity.

Aim

The aim of the study was to determine the sputum positivity for acid fast bacilli (AFB) among patients attending a tertiary health care centre Lucknow.

METHODS

Study design

It was a cross-sectional study.

Study period

The study period was of 6 months from January 2018 to June 2018.

Study place

The study was carried out at Integral Institute of Medical Sciences and Research Hospital, Lucknow.

Sample size

The sample size was 718.

Inclusion criteria

Samples were collected from patients attending TB and chest OPD of IIMS&R Hospital and sent for AFB examination by Ziehl-Neelsen (ZN) microscopy at microbiology lab. Patients with symptom of cough lasting for more than 2 weeks were included. All age group patients were included.

Exclusion criteria

Patients with symptom of cough lasting for less than 2 weeks. Children less than 1 year. Patients with incomplete clinical records were excluded.

Smear preparation

Prepare smears from all processed specimens before inoculation into medium. After decontamination, concentration and resuspension of the pellet mix the specimen well with a pipette and place about one drop or 2-3 loop fulls on a clean microscope slide. Spread the smear about 1.5×1 cm. Allow the smear to air dry completely. Heat-fix the smear either by passing over the flame three to four times or by heating on a slide warmer at 65-75°C for 2-3 hours or overnight.

Observation

Examine the slide under the microscope using 40X lens to select the suitable area and then examine under the 100X lens using a drop of immersion oil. Record the result in laboratory form and laboratory register appropriately.

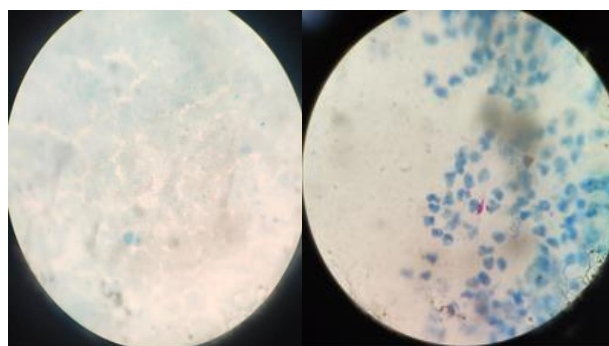


Figure 1: Direct microscopy image.

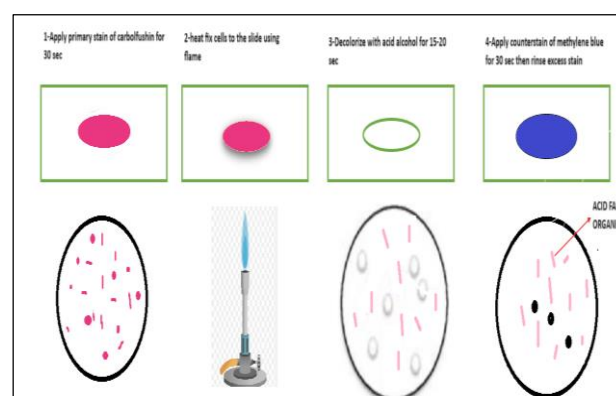


Figure 2: Processing of ZN staining.¹³

Table 1: Grading wise interpretation of sputum stained by ZN stain (WHO).

Observations	Interpretation
More than 10 bacilli/field	+++
From 1-10 bacilli/field	++
From 10-99 bacilli/100 field	+
From 1-9 bacilli/100 fields	Write the exact no
No bacilli seen	Negative

RESULTS

Out of 718 patient's samples, 128 were smear positive by ZN staining method (Figure 3). Out of which 81 (63.28%) were males and 47 (36.72%) were females (Figure 4).

According to age distribution 35 (27.35%) were <30 years of age, 68 (53.12%) were in between 30 and 60 while 25 (19.53%) were >60 years of age (Figure 5). 105 (82.03%) positive patients were found to be from rural area and remaining 23 (17.9%) patients belong to urban area (Figure 6). 29 patients were found to have a past history of TB of 1 year. Out of 128 positive patients none were smokers. 25 (19.53%) were tobacco chewers. 11 (8.56%) were contact with a case of TB (Figure 7).

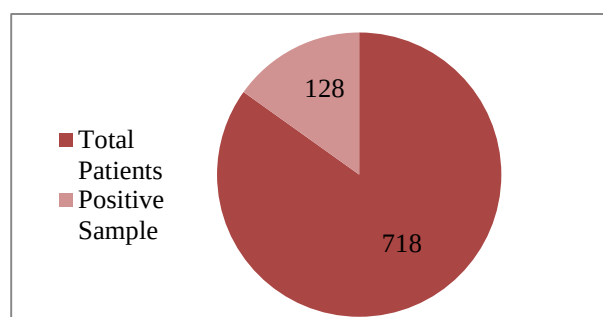


Figure 3: 718 patient's samples, 128 were smear positive by ZN staining method.

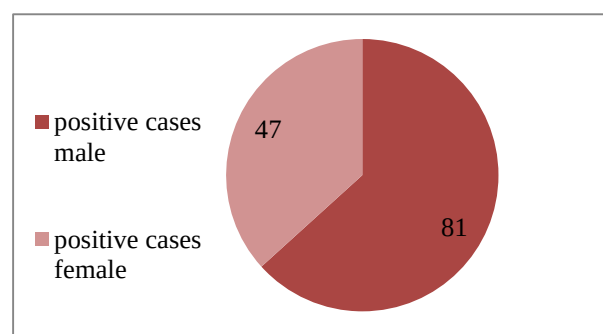


Figure 4: Gender wise distribution.

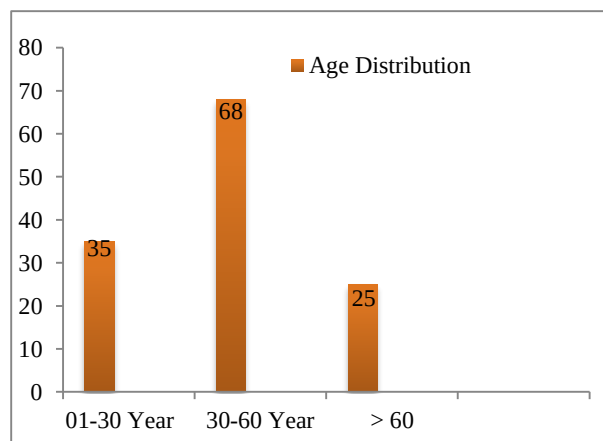


Figure 5: Age wise distribution.

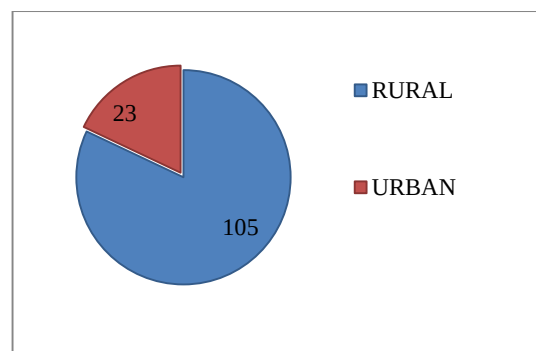


Figure 6: Population area wise distribution.

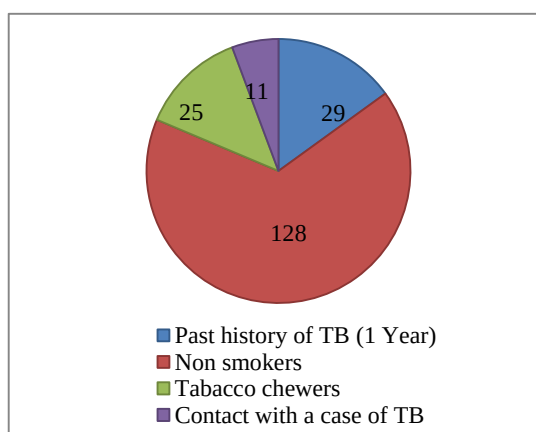


Figure 7: Distribution as per patient history.

DISCUSSION

In our study TB remains as a leading cause of morbidity and mortality all over the world. A total of 718 cases of new sputum smear positive cases were studied. In the present study most of the cases were observed 718 patient's samples, 128 were smear positive by ZN staining method. Out of which 81(63.28%) were males and 47 (36.72%) were females. According to age distribution 35 (27.35%) were <30 years of age, 68 (53.12%) were in between 30 and 60 while 25 (19.53%) were >60 years of age. 105 (82.03%) positive patients were found to be from rural area and remaining 23 (17.9%) patients belong to urban area. 29 patients were found to have a past history of TB of 1 year. Out of 128 positive patients none were smokers. 25 (19.53%) were tobacco chewers.

11 (8.56%) were contact with a case of TB.⁹ In this study a total of 283 TB suspects, 142 (50.2%) male, were included in the study. Over half (55.8%) of them were under <35 years age category, and majority (70.3%) were Orthodox Christians. Over a third (35.7%) respondents had no education, and 72.4% of them were unemployed. The prevalence of smear positive pulmonary TB among participants was 43 (15.2%) or (1519/100000). Younger age, cough ≥ 2 weeks, no education, purulent sputum, HIV/AIDS, sputum collection orientation, sputum coughed from lung and staining quality were statistically

significant (p value <0.05) and showing positive association with smear positivity.⁶

In this study a total of 96,787 out-patients were registered. Among them 69,209 (72%) were new adult out-patients. Using >2 weeks of cough instead of >3 weeks as the criterion for screening, there was an overall increase of 58% in CS and 23% increase in the detection of smear-positive cases. Among 211 patients, 210 were positive at least by one smear from the initial two specimens. Increase in the work-load if 2 smears were done for patients with cough of >2 weeks cough were 2 specimens (i. e.; 13 to 15) per day for an adult OPD of 150.⁷ In this study the total samples tested during the study period were 1720 sputum samples. Total number of males in this study were 1140 (66.27%) and females were 580 (33.72%). Total sputum AFB smear-positive patients by sputum microscopy were 344. Hence, percentage of sputum AFB smear-positive patients was 20%.

Total number of patients whose sputum GeneXpert MTB was positive were 292. Hence, the percentage of sputum GeneXpert positive was 16.97%. Total number of R-resistant (MDR TB) cases detected during the study period were 21. The percentage of MDR pulmonary TB cases in all sputum samples tested was 1.22%. In our study out of which 81 (63.28%) were males and 47 (36.72%) were females. According to age distribution 35 (27.35%) were <30 years of age, 68 (53.12%) were in between 30 and 60 while 25 (19.53%) were >60 years of age. 105 (82.03%) positive patients were found to be from rural area and remaining 23 (17.9%) patients belong to urban area.¹² In this study we found that among 43 patients of age >50 years, after two months of treatment, 15 (35%) patients were sputum smear positive.

Among 66 smoker patients, 19 (20%) patients were sputum smear positive. Among 24 patients of bilateral, 12 (50%) patients were sputum smear positive. Out of 40 patients of $+3$ bacillary load, 17 (42%) were sputum smear positive. In our study according to age distribution 35 (27.35%) were <30 years of age, 68 (53.12%) were in between 30 and 60 while 25 (19.53%) were >60 years of age. 105 (82.03%) positive patients were found to be from rural area and remaining 23 (17.9%) patients belong to urban area. 29 patients were found to have a past history of TB of 1 year. Out of 128 positive patient none were smokers. 25 (19.53%) were tobacco chewers. 11 (8.56%) were contact with a case of TB.¹⁴

In this 100 patients in the age group of 28-50 years 2. 76% males and 24% women 3.76% were somker; 22% never smoker and 2% never smoker and our study 29 patients were found to have a past history of TB of 1 year. Out of 128 positive patient none were smokers. 25 (19.53%) were tobacco chewers.¹¹ 8.56% were contact with a case of TB.⁹ In this study the total of 283 TB suspects, 142 (50.2%) male, were included in the study. It is similar to our study 718 patient's samples, 128 were smear positive by ZN

staining method. Out of which 81 (63.28%) were males and 47 (36.72%) were females.

Another study over half (55.8%) of them were under <35 years age category, and majority (70.3%) were Orthodox Christians. Over a third (35.7%) respondents had no education, and 72.4% of them were unemployed. The prevalence of smear positive pulmonary TB among participants was 43 (15.2%) or (1519/100000). Younger age, cough ≥ 2 weeks, no education, purulent sputum, HIV/AIDS, sputum collection orientation, sputum coughed from lung. In our study according to age distribution 35 (27.35%) were <30 years of age, 68 (53.12%) were in between 30 and 60 while 25 (19.53%) were >60 years of age. 105 (82.03%) positive patients were found to be from rural area and remaining 23 (17.9%) patients belong to urban area. 29 patients were found to have a past history of TB of 1 year.

CONCLUSION

TB poses a great public health challenge in India. In developing countries like India, under limited resources practicing sputum smear microscopy is the most practicable and cheapest tool for demonstration of AFB in sputum. Demonstration of AFB in smear has a great important in control of TB, as smear positivity directly correlates with infectivity. ZN staining method is the most commonly used worldwide.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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