



## OUTCOME OF REPEAT SPUTUM AFB EXAMINATION IN INITIAL SPUTUM NEGATIVE PATIENTS SUSPECTED TO HAVE PULMONARY TUBERCULOSIS IN A TERTIARY CARE HOSPITAL

### Pulmonary Medicine

<b>Dr. Atush Alipuria</b>	Resident, Department of Respiratory Medicine, MGM Medical college.
<b>Dr. Sunil Jadhav*</b>	Associate Professor, Department of Respiratory Medicine, MGM Medical college *Corresponding Author
<b>Dr. Ashish Deshmukh</b>	Professor and HOD Department of Respiratory Medicine, MGM Medical college.
<b>Dr. Hafiz Deshmukh</b>	Assistant Professor, Department of Respiratory Medicine, MGM Medical college
<b>Dr. Shivprasad Kasat</b>	Assistant Professor, Department of Respiratory Medicine, MGM Medical college
<b>Dr. Ashish Kendre</b>	Resident, Department of Respiratory Medicine, MGM Medical college.

### ABSTRACT

**Background:** Burden of pulmonary tuberculosis (PTB) is associated with success of directly observed therapy (DOT) services provided to patients suffering from PTB visiting a Tertiary Care Hospital in Aurangabad Dist., Maharashtra, India.

**Objective:** This study was conducted to assess the outcome of repeat sputum AFB smear examination in patients who were smear negative on initial assessment in a Tertiary Care Hospital.

**Methods:** Sputum AFB smears of suspected PTB patients done at RNTCP lab from January 2015 to December 2018, at MGM Medical college and Hospital were assessed.

**Results:** Of the total 7043 PTB suspected patients examined in four years, sputum smear positive-PTB (SSP-PTB) cases were found to be 1095 (15.54%). A total of 321 cases were sent for repeat sputum examination in symptomatic initial sputum negative cases failing the antibiotic trial turned SSP-PTB were 62 (19.31%). Thus a considerable number of cases were missed in the initial screening (5.36%).

**Conclusion:** A significant number of apparently smear negative TB cases may in fact be smear positive due to various reasons and can be detected by a simple repeat sputum examination. Yield of sputum positive cases in repeat sputum examination is slightly higher as in initial sputum examination i.e. 19.31%. Therefore, the policy of repeat sputum examination in symptomatic initial sputum negative cases failing the antibiotic trial should be meticulously followed as advocated in the RNTCP diagnostic algorithm. Although the distribution of sputum positive smear results had no significant yearly variations and the overall burden of SSP cases did not decrease, therefore a lot of work needs to be undertaken on the PTB prevention and control program for the national action plan 2017-2025.

### KEYWORDS

#### 1. BACKGROUND

Tuberculosis (TB) is major public health infectious disease, mainly caused by *Mycobacterium tuberculosis* (MTB) bacteria. It is the second leading cause of morbidity and mortality among infectious diseases. According to World Health Organization, WHO, 2017 report, currently around 9 million people are expected to acquire the disease. India, a country located in SE Asia with one of the highest recorded TB incidence, is one of the highest TB burden countries, with an estimated annual TB incidence of 2.74 million i.e. 204/100,000 people and with mortality rates of 31/100,000 people. [1-3].

Fluorescent staining technique is one of the MTB diagnostic approaches and employed as an important method in an endemic area where there is high patient load, for the examination of the bacilli from the given sample and also recommended by WHO as one of the strategic tools in the management of tuberculosis worldwide [3]. Demonstrating the MTB using Fluorescent staining is a fast and accurate method in a high burden country like India.

The aim of the current study was to assess burden of sputum smear positive PTB results as measured by fluorescent staining in patients susceptible for PTB and re-examination of sputum of patients with a strong clinical suspicion which came sputum negative for the first time in a Tertiary Care Hospital. In the last four years (Jan 2015 to Dec 2018), there are large number of TB cases detected in this Tertiary hospital. Assessing the burden of sputum positive PTB in clinically suspected patients in the region may indirectly reflect the success of TB control strategies in the region and India as a whole.

#### 2. METHODS

A retrospective study design was conducted to determine the trends of PTB among suspected patients and efficacy of repeat sputum

examination, registered at RNTCP Centre of MGM Medical College & Hospital, Aurangabad, Maharashtra from January 2015 to December 2018. During this period, two sputum samples of patients presenting with cough of more than two weeks duration were examined for *Mycobacterium tuberculosis* on microscopy according to RNTCP guidelines using Fluorescent staining<sup>6</sup>. Patients with even one smears positive for AFB were registered for smear positive tuberculosis and depending on whether patient was a new or resistant case, sputum is sent for CBNAAT and FL-LPA and accordingly started on AKT.

Patients in whom both the samples were smear negative, were prescribed symptomatic treatment with broad spectrum antibiotics (other than quinolones) for 10-14 days. Patients, who remained symptomatic after antibiotic course, were advised a repeat sputum smear examination (1 sample) as per the revised algorithm<sup>6</sup>. If the smear turns out to be positive, the patient was diagnosed as having smear positive tuberculosis and prescribed AKT as above. X-ray was advised if the result of repeat sputum sample examination was negative and the patient was symptomatic. If the chest X-ray consistent with pulmonary tuberculosis, patient's sputum is sent for CBNAAT as per RNTCP guidelines<sup>6</sup>.

Thus, according to our study protocol data was collected only from MGM Hospital laboratory log book. Data collection was done by one of the authors, by considering all laboratory result registration log books for the past four years. Out of the total reviewed documents. On the structured data collection format, information regarding study participants whether tuberculosis suspects are new or re-examination cases, AFB test results, date, and months and years of diagnosis was gathered. Quality assurance of the collected data was made by checking completeness and consistency immediately after data collection. The collected data was summarized on the same day of the

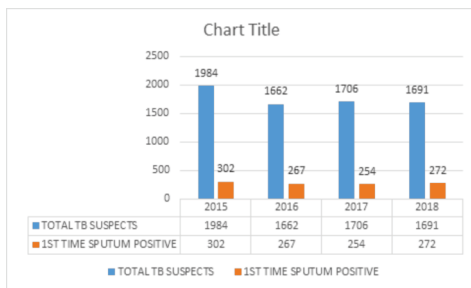
data collection.

**3. RESULTS**

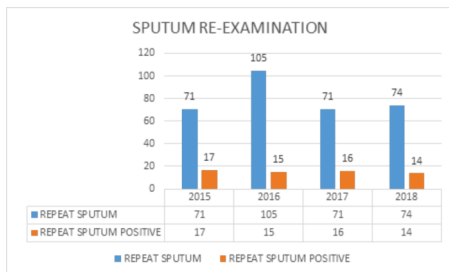
Of the total 7043 PTB suspected patients examined in four years, sputum smear positive-PTB (SSP-PTB) cases were found to be 1095 (15.54%). A total of 321 cases were sent for re-examination of sputum for those patients in which high clinical suspicion existed, but who were initially sputum negative for PTB and then were SSP-PTB were found out to be 62 (19.31%). Thus a considerable number of cases were missed in the initial screening (5.36%), thereby indicating adequate screening and rescreening is required for the success of RNTCP program. 1157(16.42%), incidence being 30.4/100,000 similar to the national average of 31/100,000. Population of Aurangabad district taken as 38 lakhs according to 2011 census data.

YEARS	TOTAL TB SUSPECTS	1ST TIME SPUTUM POSITIVE	REPEAT SPUTUM	REPEAT SPUTUM POSITIVE
2015	1984	302	71	17
2016	1662	267	105	15
2017	1706	254	71	16
2018	1691	272	74	14

**Graph 1: Total sputum positive patients and their reexamination form Jan 2015 to Dec 2018.**



**Table 1: All pulmonary tuberculosis suspects and sputum positive patients visiting MGM Hospital, Aurangabad from Jan 2015–Dec 2018.**



**6. DISCUSSION**

Smear negative tuberculosis presents a diagnostic challenge to the treating physicians around the world. The exact proportion of smear positive TB cases among suspected TB cases depends on the quality of the microscopy, local TB and HIV prevalence and the index of suspicion<sup>7</sup>. In the vast majority of cases however, diagnosis is made on clinical and radiological grounds<sup>4</sup>.

It is interesting to note that many of these smear negative TB patients can be easily diagnosed by a simple repeat examination of their sputum. In a study from Malawi, of 352 patients registered for treatment of smear negative tuberculosis, 22% were confirmed as sputum positive TB by mere repeat sputum smear microscopy<sup>8</sup>. In the present study, 5.39% of 5948 initial smear negatives underwent repeat sputum examination with average positivity rate of 19.31% (range:14% - 24%), which is better than the expected range of 10-16% smear positivity of the new cases in RNTCP<sup>11</sup>. The initial smear negativity in all these patients cannot be explained on the basis of laboratory error only. Poor quality of the sputum sample is one of the most common causes of a false negative result<sup>9</sup>. Besides, since mycobacteria are excreted intermittently into sputum from cavities<sup>1</sup>, some of these cases could have been genuinely sputum negative on initial examination. In some initial sputum negative patients, disease progression may have also led to sputum positivity during the repeat examination<sup>8</sup>. In the absence of repeat sputum examination, the above 62 patients diagnosed as sputum positive after repeat sputum

examination would have undergone undiagnosed. This would have probably increased the burden of PTB in the society. TB suspects with normal /minimal abnormal changes on CXR may not be diagnosed as pulmonary tuberculosis and continue to transmit the infection to the healthy population. In early stages of TB, especially the HIV positive patients may have normal or minimal changes on X-ray. In a study carried out by Harries et al in a high HIV prevalent area, 16(21%) of Pulmonary TB suspects with negative sputum smears and a normal /minimally abnormal CXR were culture positive for *M. tuberculosis*. Seven of these 16 patients developed CXR suggestive of TB by three months<sup>4</sup>. Normal X-ray appearance was seen in a significant number of culture positive patients in a low HIV setting in neighboring Pakistan<sup>15</sup>. Such cases may stand more chances of diagnosis on repeat sputum examination.

Reliance on X-rays may also increase chances of over-diagnosis. In a study in Kenya, the number of patients labelled as having TB using CXR with a negative culture that were placed on treatment was rather high; 22% among all suspects and 45% among smear negative suspects<sup>9</sup>.

Although with increased availability of CBNAAT at district and tertiary centers have brought down the initial sputum negative cases to a minimum, but its availability is not far spread.

**7. CONCLUSIONS**

To conclude, a significant number of apparently smear negative TB cases may in fact be smear positive due to various reasons. A simple repeat sputum examination gives a chance of detection of these sputum positive cases among the symptomatic initial sputum negatives. Yield of sputum positive cases in sputum re-examination is slightly more than the initial sputum examination i.e. 14-24%.

Therefore, the policy of repeat sputum examination in symptomatic initial sputum negative cases should be meticulously followed as advocated in the RNTCP diagnostic algorithm. Though, this policy would lead to an increase in laboratory burden, but would also spare the possibility of diagnostic errors due to over/ under-diagnosis and the increased cost with radiology.

Although the newer guidelines suggest using CBNAAT along with repeat sputum examination in smear negative suspected patients, a simple repeat sputum examination can be a cost effective method to diagnose PTB.

In MGM Hospital, the incidence of AFB sputum smear positive PTB cases is similar to national average. Usage of newer modalities in detection of PTB like CBNAAT are being widely used, as a result few cases are missed. Large scale and longitudinal research is highly recommended to describe the real trend of pulmonary tuberculosis in Aurangabad District.

Moreover, continuous advocacy and health information is also required to reduce further the burden of tuberculosis in the region in particular and in India at large.

**Abbreviations**

- AFB: Acid Fast Bacilli
- DOT: Directly observed therapy
- MTb: Mycobacterium tuberculosis
- PTB: Pulmonary tuberculosis
- TB: Tuberculosis
- WHO: World Health Organization.

**CBNAAT:** Cartridge based nucleic acid amplification test

**Conflicts of Interest:** None

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