

## Original Research Article

# Sputum versus bronchial washings for diagnosis of pulmonary tuberculosis- a prospective study of 53 patients

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### ABSTRACT

**Background:** Tuberculosis is a major global public health problem. It is caused by mycobacterium tuberculosis and it is a leading cause of death in developing countries like India. WHO recommends the detection of acid fast bacilli in sputum as the initial diagnosis of pulmonary TB. Tuberculosis is spread from person to person through air by droplet nuclei. So, early detection and prompt treatment of tuberculosis is main cornerstone to prevent transmission into community. Bronchial washing is very helpful for early detection of mycobacterium tuberculosis.

**Methods:** This is a prospective study of 53 sputum smear negative patients underwent for bronchoscopy. After a detailed medical history and physical examination, Patients with a negative sputum smear AFB examination and a strong clinico-radiological suspicion of pulmonary tuberculosis were then counseled, consented and subjected to fiber-optic bronchoscopy with bronchial washings and bronchial biopsy in case of endobronchial lesions.

**Results:** Our study showed mean age of patient is about 43.49 year and has predominantly male patients. Most cardinal symptoms were fever (83%) and cough (74%). Most radiological findings were consolidation and cavity lesion accordingly. Sputum culture was positive in 14 (26%) patients out of 53 patients and bronchial washing smear positive for AFB in 30 (57%) patients and bronchial washing culture positive for AFB in 40 (75%) patients out of 53 patients.

**Conclusions:** Bronchial washings analysis for detection of AFB is much more reliable in comparison to direct smear microscopy and direct sputum culture examination.

**Keywords:** AFB, Fiberoptic bronchoscopy, Sputum, Tuberculosis, ZN stain

### INTRODUCTION

Tuberculosis (TB), an infectious disease caused by Mycobacterium tuberculosis, is the major health care burden responsible for morbidity and mortality. The number of deaths due to tuberculosis is unacceptably high. Timely diagnosis and correct treatment can significantly reduce death rate. The World Health Organization (WHO) recommends the detection of acid fast bacilli (AFB) in sputum specimens as the initial approach to the diagnosis of pulmonary tuberculosis.<sup>1</sup>

However this method has a low sensitivity and little value in patients who cannot produce sputum.<sup>2,3</sup>

The maneuverability of the fiber-optic bronchoscope, along with the comfort of the patient, improved diagnostic accuracy and its documented safety as a procedure, has opened new horizons to the clinicians. The diagnostic yield of bronchial washing is likely to enhance the total diagnostic yield of tuberculosis.<sup>4,5</sup> Bronchial washing is relatively noninvasive and less expensive procedure that can be used in various lung diseases.<sup>6</sup>

The objective was to study diagnostic value of the bronchial washing performed through fiber-optic bronchoscopy in sputum smear AFB negative, X –ray positive, clinically suspected pulmonary tuberculosis patients and to study the efficacy of bronchial washing in early diagnosis of pulmonary tuberculosis.

## METHODS

It was a prospective observational study conducted in total 53 patients suspected for pulmonary tuberculosis in a tertiary care hospital in Ahmedabad district over a period of two years. Inclusion criteria were sputum negative patients above 12 years of age who had clinical history, physical findings, laboratory investigations suggestive of pulmonary tuberculosis were included in this study.

After explaining the procedure to patients in their vernacular language and obtaining consent from them, a detailed medical history and demography was obtained which included history of cough, fever, chest pain, dyspnoea, weight loss and haemoptysis. The duration of each symptom was documented. History of associated comorbidities was noted. Past history of a diagnosis of tuberculosis and history of anti-tuberculosis therapy taken in the past was documented. A detailed clinical examination was performed. All patients were subjected to routine investigations like a complete haemogram and a random blood sugar levels. Blood was sent for blood urea levels, serum creatinin levels, serum sodium and potassium levels, SGPT, SGOT, serum bilirubin and serum proteins levels; and for detection of HIV infection.

A chest X ray and an electrocardiogram was obtained in all patients. A morning sputum sample was sent for direct smear examination by gram stain, ZN stain, KOH preparation and sputum culture for pyogenic bacteria, acid fast bacilli and fungal organisms. Patients with a negative sputum smear AFB examination and a strong clinico-radiological suspicion of pulmonary tuberculosis were then counseled, consented and subjected to fiberoptic bronchoscopy with bronchial washings and bronchial biopsy in case of endobronchial lesions.

### Patient preparation

Patients were kept nil orally at least six hours before the procedure. All the patients were pre-medicated with 0.5mg atropine I.M. half an hour before the procedure. Topical anesthesia with 2% lignocaine was used for upper respiratory tract and transtracheal instillation. Patients were sedated with IV short acting benzodiazepine midazolam.

### Procedure

All bronchoscopies were performed with Olympus BF 2T10 bronchoscope and standard accessories were used for specimen retrieval. Different bronchoscopic

specimens like bronchial washing and bronchial biopsy (forceps and trans bronchial) were taken, appropriately preserved and sent for investigation as per the suspected diagnosis.

Bronchial washing samples from 53 patients were sent for ZN stain smear and bronchial washing culture for mycobacterium tuberculosis and biopsy for histopathology examination.

Exclusion criteria were sputum smear positive for pulmonary tuberculosis, HIV positive and pediatric patients (age less than 12 years) were not taken in this study.

## RESULTS

Table 1 shows sputum negative pulmonary tuberculosis more commonly seen in the Age group of 20-49 were 34/53 (64%).

**Table 1: Distribution of patients according to age.**

Age group (Years)	Number of patients	Percentages (%)
20-29	13	24.52
30-39	6	11.32
40-49	15	28.30
50-59	9	16.98
60-69	6	11.32
70-79	4	7.5
Total	53	100

In Table 2, out of 53 patients, male was 36 (68%) and female were 17 (32%). Male: Female ratio was 2.1 :1.

**Table 2: Distribution of patients according to sex.**

Sex	Number of patients	Percentages (%)
Male	36	67.92
Female	17	32.07
Total	53	100

Table 3 presents the cardinal symptoms of Tuberculosis as fever 44/53 (83%), cough 39/53 (74%), chest pain 34/53 (64%) and loss of weight 32/53 (60%).

**Table 3: Distribution of patients according to symptoms.**

Symptoms	Number of patients	Percentages (%)
Fever (low grade)	44	83.01(%)
Cough	39	73.58(%)
Chest pain	34	64.15%
Loss of weight	32	60.37(%)
Dyspnoea	23	43.39(%)
Haemoptysis	17	32.07%

Table 4 shows most common radiological patterns were presented as consolidation (53%), cavitary lesion (26%) and mediastinal lymphadenopathy (9%).

Table 5 shows sputum culture was positive in 14 (26%) patients out of 53 patients and BAL smear positive for AFB in 30 (57%) patients and BAL culture positive for AFB in 40 (75%) patients out of 53 patients.

Table 6 shows non-resolving pneumonia is the other most common diagnostic finding through fiber optic bronchoscopy than tuberculosis.

**Table 4: Distribution of patients according to radiological features.**

Radiological features	Number of patients	Percentages (%)
Consolidation	28	52.83
Cavitary lesion	14	26.41
Mediastinal lymphadenopathy	5	9.43
Fibrosis	4	7.54
Calcification	2	3.77
Total	53	100

**Table 5: Smear and culture results of sputum and BAL samples.**

Sample N=53	Smear positive (%)	Smear negative (%)	Culture Positive (%)	Culture Negative(%)
Sputum	0 (%)	53 (100%)	14 (26.41%)	39 (73.58%)
BAL	30 (56.60%)	23 (43.39%)	40 (75.47%)	13 (24.52%)

**Table 6: Additional diagnosis made by other samples collected by fiber optic bronchoscopy.**

Diagnosis	No. of cases
Carcinoma lung	4
Aspergilloma	2
Pneumonia	6
Interstitial lung disease	1
Total	13

## DISCUSSION

In this study, Mean age is 43.39 years with prominently male patient. Out of 53 patient's males were 36 (68%) and female were 17 (32%) with male: female ratio 2.1:1.<sup>8-11</sup> Most cardinal symptoms were fever (83%) and cough (74%). Most radiological findings were consolidation and cavity lesion accordingly.<sup>10,12,13</sup> Out of 53 sputum smear negative patients, Sputum culture was positive in 14 (26%) patients whereas bronchial washings smear was positive for AFB in 30 (57%) patients and bronchial washing culture was positive for AFB in 40 (75%) patients.<sup>14</sup>

Flexible bronchoscope has become very useful tool in patient care and medical research. Proper selection of instrument is necessary to ensure effective and safe procedure.

In present study total 53 sputum negative patients suspected for pulmonary tuberculosis. The insignificant difference in clinical presentation, X-ray findings in this study suggest that though signs and symptoms and radiographic findings provide important clue for pulmonary tuberculosis but they cannot confirm the diagnosis of pulmonary tuberculosis.<sup>5</sup> Acid fast staining

and sputum culture isolation can only provide definitive diagnosis. Therefore, patients with radiographic and clinical findings compatible with PTB but sputum smear negative are a challenge for physician to start anti tuberculosis therapy.

It is concluded that bronchoscopy should be conducted in all patients with sputum negative suspected pulmonary tuberculosis and bronchial washings is considered best for diagnosis of sputum negative pulmonary TB.<sup>8</sup> Higher yield of bronchial washings is said to be due to large volume of saline used in involved bronchial segments and less anaesthetic agent.<sup>15</sup> Bronchial washings has higher sensitivity and specificity than induced sputum specimens.<sup>16</sup> Fiberoptic bronchoscopy is useful and safe in establishing accurate and early diagnosis of lower respiratory tract infections and no complications were occurred among patients undergoing bronchoscopy.<sup>17</sup>

## CONCLUSION

At present, we conclude that bronchial washings analysis for detection of AFB is much more reliable in comparison to direct smear microscopy and direct sputum culture examination.

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