

# Diagnostic Accuracy of Bronchial Washings in Smear Negative Pulmonary Tuberculosis

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## ABSTRACT

**Background:** Diagnostic modalities for sputum smear negative pulmonary tuberculosis are multiple with different accuracies. Bronchial washing may help reduce the non-indicated use of anti-tuberculosis treatment.

**Aim:** To determine the diagnostic accuracy of bronchial washing for AFB in smear negative pulmonary tuberculosis (PTB) taking sputum culture as gold standard.

**Methods:** This cross-sectional survey conducted at Department of Medicine, Sharif Medical & Dental College Lahore. One hundred and eighty patients with suspected smear negative pulmonary tuberculosis were enrolled in the study. All patients underwent bronchoscopy procedure according to standard protocol so their bronchial washings were sent for smear examination immediately. Results of both post bronchoscopy sputum culture and bronchial washings were recorded. Diagnostic accuracy of bronchial washing was calculated.

**Results:** The mean age of 35.34±9.14 ranged from 23 to 56 years. Where 105 patients (58.3%) were male and 75 patients (41.7%) were female. In our study, sensitivity of bronchial washing came out 62%, specificity 31%, positive predictive value 72%, negative predictive value 23%, taking culture as gold standard in patients with tuberculous. There was no effect of gender and age on diagnostic accuracy.

**Conclusion:** It is concluded that bronchial washing can be used as a proxy indicator of tuberculosis in patients with sputum smear negative pulmonary tuberculosis till we may wait for results of culture as it has shown high sensitivity.

**Key words:** Sputum smear negative pulmonary tuberculosis, Diagnostic accuracy, Bronchial washing,

## INTRODUCTION

Tuberculosis, an infection caused by mycobacterium tuberculosis, has been known to mankind since prerecorded history. Its incidence decreased after 1960's but there is again a rise since 1980's. Now it is considered as reemerging infection. World health organization declared it a global health emergency in 1993.<sup>1</sup> Tuberculosis is prevalent in Pakistan and it ranks at 6th amongst the countries with highest burden of disease in the world. Pakistan contributes about 44 % of the disease burden in EMRO region. According to WHO, Pakistan has incidence of 80/100000 smear positive cases per year and 177/100000 for all types of cases.<sup>2</sup> Major diagnostic procedures employed for diagnosing pulmonary tuberculosis are chest radiography and sputum culture and smear for detection of Acid- Fast bacilli (AFB).<sup>1</sup> In those who have strong clinical and radiological suspicion of tuberculosis it is pertinent to demonstrate presence of AFB either through sputum

smear or culture so as to avoid unnecessary empiric therapy. Diagnosis of sputum/smear-negative pulmonary tuberculosis patients can be challenging and time consuming and many patients may receive empirical anti-tubercular treatment unnecessarily. Fibreoptic bronchoscopy may assist early diagnosis in such patients.<sup>3,4</sup> Khan et al<sup>3</sup> also demonstrated that smear of bronchial washing was able to detect in 48% of the sputum smear negative cases. Choudhury and Patel<sup>4</sup> demonstrated that the sensitivity of AFB-smears in samples from post bronchoscopy sputum and bronchial washings were 74% and 58% respectively, with specificity being 70%. Gold standard criterion for starting anti tuberculosis treatment is sputum culture for AFB. Different techniques have been applied to increase the yield of sputum microscopy.<sup>5-7</sup> There is no local study available showing the diagnostic accuracy of bronchial washing. Present study will evaluate the diagnostic accuracy of bronchial washing smear for diagnosis of pulmonary tuberculosis. Results of this study will help the physician make a definite diagnosis of pulmonary tuberculosis and help the patient to refrain from undue anti tuberculosis treatment.

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## PATIENTS AND METHODS

This cross-sectional survey was carried out in Department of Medicine, Sharif Medical & Dental College Lahore from January 2015 to 30<sup>th</sup> June 2015. One hundred and eighty patients who are suspected of smear negative pulmonary tuberculosis were included. Suspected Smear negative patients of pulmonary tuberculosis was defined as the patient having two sputum smear reports as negative for AFB by direct microscopy within the last 6 months but labeled as pulmonary TB by a consultant pulmonologist, and has radiological evidence of Tuberculosis (consolidation or fibrosis on CXR). Bronchial washing was considered positive if >10/HPF are seen on direct microscopy while sputum culture was labeled positive if >10/HPF are seen after culture. Patients who have used empirical therapy for tuberculosis for more than 2 weeks determined by history and clinical record, patients who are unwilling to undergo bronchoscopy were excluded. Informed consent was taken from patients and was explained that the data would be used and published but confidentiality would also be maintained. Demographic profile was recorded including age, gender and address. All data was recorded on structured Performa (Annexure). Patients underwent bronchoscopy procedure according to standard protocol so their bronchial washings and post bronchoscopy sputum was sent for smear examination immediately to pathology laboratory of Sharif Medical College. Results of both post bronchoscopy sputum culture and bronchial washings was recorded. Outcome variables were patients detected positive for sputum smear negative PTB by bronchial washings smear and post-bronchoscopy sputum culture. Data was entered and analyzed in SPSS 18.0 version.

## RESULTS

In our sampled population 180 patients were included with mean age of  $35.34 \pm 9.144$  ranged from 23 to 56 years. Sixty patients (33.3%) were below 30 years of age and remaining 120 patients (66.7%) were over 30 years of age or above. Where 105 patients (58.3%) were male and 75 patients (41.7%) were female. 115 patients (63.9%) showed positive results for AFB on bronchial washing in our study sample (n=180) whereas remaining 65 patients (36.1%) showed negative results. In 133 patients (73.9%), sputum culture was positive and in 47 patients (26.1%) had negative sputum culture. When we cross tabulated bronchial washing with sputum culture, out of 115 with Bronchial Washing, 85 showed positive results for sputum culture remaining 32 were

negative. In 133 patients (73.9%), sputum culture was positive and in 47 patients (26.1%) had negative sputum culture. When we cross tabulated bronchial washing with sputum culture, out of 115 with Bronchial Washing, 85 showed positive results for sputum culture remaining 32 were negative. In our study, sensitivity of bronchial washing came out 62%, specificity 31%, positive predictive value 72%, negative predictive value 23%, taking culture as gold standard in patients with tuberculosis. Among 115 patients with Bronchial Washing, 51 male patients showed positive results for the culture and 32 female patients showed positive results for sputum culture. For male patients, sensitivity of bronchial washing came out 62%, specificity 41%, positive predictive value 78%, negative predictive value 25%, taking culture as gold standard in patients with tuberculosis. For female population, sensitivity of bronchial washing came out 61.5%, specificity 41%, positive predictive value 78%, negative predictive value 25%, taking culture as gold standard in patients with tuberculosis. Among 115 patients of Bronchial Washing, 31 patients out of 39 showed positive results for culture who had age below 30 years meanwhile in 76 patients with bronchial washing, 52 showed positive results for culture for those who had age either 30 years or above. For younger patients, sensitivity of bronchial washing came out 63%, specificity 27%, positive predictive value 98%, negative predictive value 14.2%, taking culture as gold standard in patients with tuberculosis. For patients above 30 years of age, sensitivity of bronchial washing came out 62%, specificity 33%, positive predictive value 68%, negative predictive value 27%, taking culture as gold standard in patients with tuberculosis.

## DISCUSSION

More than 2 billion people (about one-third of the world population) are estimated to be infected with Mycobacterium tuberculosis.<sup>8</sup> The global incidence of tuberculosis (TB) peaked around 2003 and appears to be declining slowly.<sup>9,10</sup> According to the World Health Organization (WHO)<sup>11</sup>, in 2010, 8.8 million individuals became ill with TB and 1.4 million died. But situation seems different in Pakistan. Major diagnostic procedures employed for diagnosing pulmonary tuberculosis are chest radiography and sputum culture and smear for detection of Acid-Fast bacilli (AFB)<sup>1</sup>. In those who have strong clinical and radiological suspicion of tuberculosis it is pertinent to demonstrate presence of AFB either through sputum smear or culture so as to avoid unnecessary empiric therapy.<sup>12</sup> In the present study, sensitivity of bronchial washing came out 62%, specificity 31%, positive

predictive value 72%, negative predictive value 23%, taking culture as gold standard in patients with tuberculous. Altaf et al demonstrated that smear of bronchial washing was able to detect in 48% of the sputum smear negative cases.<sup>3</sup> Ganguli et al<sup>4</sup> demonstrated that the sensitivity of AFB-smears in samples from post bronchoscopy sputum and bronchial washings were 74% and 58% respectively, with specificity being 70%.

Among 115 patients with Bronchial Washing, 51 male patients showed positive results for the culture and 32 female patients showed positive results for sputum culture. For male patients, sensitivity of bronchial washing came out 62%, specificity 41%, positive predictive value 78%, negative predictive value 25%, taking culture as gold standard in patients with tuberculous. For female population, sensitivity of bronchial washing came out 61.5%, specificity 41%, positive predictive value 78%, negative predictive value 25%, taking culture as gold standard in patients with tuberculous.

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## CONCLUSION

It is concluded that bronchial washing can be used as a proxy indicator of tuberculosis in patients with sputum smear negative pulmonary tuberculosis till we may wait for results of culture as it has shown high sensitivity. In our study, sensitivity of bronchial washing came out 62%, specificity 31%, positive

predictive value 72%, negative predictive value 23%, taking culture as gold standard in patients with tuberculous.

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