ISSN: 0975-3583, 0976-2833 VOL14, ISSUE8, 2023

ORIGINAL RESEARCH ARTICLE

Comparison of Gene Xpert with AFB smear microscopy, MGIT Culture and Histopathology in pleural biopsy sample of suspected tubercular pleural effusion cases.

Dr. Dilip Chawda[1] (Assistant Professor) & Dr. Tapan Surana[2] (Assistant Professor)

Dept. of Respiratory Medicine, LNCT Medical College, Indore, M.P.[1&2]

Corresponding Author: Dr. Dilip Chawda

ABSTRACT:

Background & Method: The aim of present study is to compare Gene Xpert findings in suspected tubercular pleural effusion cases with AFB smear, MGIT Culture and Histopathology in pleural biopsy. A sample which is found to be positive by any of three tests (smear microscopy, histopathology, MGIT culture) were considered as final positive as well as considered as composite reference standard (gold standard) and was compared with Gene Xpert.

Result: Gene Xpert assay in Pleural biopsy was found positive in 26% cases; among these, four cases were rifampicin resistant. MGIT Culture was positive in 43% cases and histopathology was positive for 61% cases. While smear microscopy was positive in only 8% cases.

Conclusion: Gene Xpert of pleural biopsy sample is a better diagnostic modality as compared to the direct smear examination for diagnosis of tubercular pleural effusion. But MGIT culture & histopathology of pleural biopsy sample are better diagnostic modality as compared to the Gene Xpert assay for diagnosis of tubercular pleural effusion.

Keywords: Gene Xpert, AFB smear, pleural biopsy, MGIT Culture, histopathology, tubercular pleural effusion

Study Designed: Cross-sectional Study.

1. INTRODUCTION

Tubercular pleural effusion is a type IV hypersensitivity reaction to mycobacterial protein and the mycobacterial load in the pleural fluid is usually low.[1]

Several studies have evaluated the performance of Gene Xpert MTB/RIF assay using pleural fluid. Overall, these studies show sensitivity of 46.4% and specificity 99.1%.[2-4]

Few studies have evaluated the performance of Gene Xpert MTB/RIF assay using tissue biopsy sample (other than from a lymph node). Overall, these studies show sensitivity of 81.2% and the specificity 98.1%.[5]

The overall sensitivity and specificity of Gene Xpert MTB/RIF assay using pleural biopsy specimens for pleural tuberculosis diagnosis were 85.5% and 97.2%, respectively.[6] The Gene Xpert correctly identified 90% of phenotypic rifampicin resistant cases and around 94% of

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE8, 2023

phenotypic rifampicin susceptible cases. Gene Xpert MTB/RIF assay on pleural biopsy specimens may provide an accurate diagnosis of pleural tuberculosis in patients who had a negative AFB smear.[6]

In view of paucity of studies of Gene Xpert MTB/RIF assay in pleural biopsy samples, the present study is planned to further study the role of Gene Xpert MTB/RIF assay and compare it with composite reference standard [histopathological examination, smear and culture] in the diagnosis of tubercular pleural effusion using pleural biopsy samples.

2. MATERIAL & METHOD

This study was a cross-sectional study. Suspected tubercular pleural effusion patients aged 14 years or more were en-rolled for this study from the Outpatient department of National Institute of Tuberculosis & respiratory diseases, New Delhi.

The pleural biopsy sample was tested for tuberculosis by smear microscopy, histopathology, MGIT culture and Gene Xpert. A sample which is found to be positive by any of three tests (smear microscopy, histopathology, MGIT culture) were considered as final positive as well as was considered as composite reference standard (gold standard) and was compared with Gene Xpert.

Clinically suspected tubercular pleural effusion cases coming in the outpatient department of National Institute of Tuberculosis and Respiratory Diseases, New Delhi, was enrolled for the study. Informed medical consent was obtained from all enrolled patients and detailed clinical history and physical examination was recorded in the proforma.

Following investigations were carried out: -

1) Complete blood count
2) Blood sugar
3) Serum biochemistry: Liver function tests, Kidney function tests, Serum electrolytes.
4) HIV Test
5) Mantoux test
6) Sputum examination for AFB
7) Chest x-ray PA view

INCLUSION CRITERIA:-

Patients aged more than 14 years, with clinically suspected tubercular pleural effusion.

EXCLUSION CRITERIA: -

1) Sputum AFB positive cases
2) Patient who declines to give consent for the study.
3) Less than 14 years of patient.

3. RESULTS

Fifty-four patients have pleural fluid ADA level between 40 u/l to 70 u/l and remaining forty-six patients has pleural fluid ADA level more than seventy.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE8, 2023

Table 1: Comparison of the Gene Xpert with AFB direct smear results in pleural biopsy sample

	POSITIVE	**NEGATIVE**	**Total no. of Patients**
AFB DIRECT SMEAR	8	92	100
Gene Xpert	26	74	100

Gene Xpert of pleural biopsy sample is a better diagnostic modality as compared to the direct smear examination for diagnosis of tubercular pleural effusion (p=0.00035).

Table 2: Comparison of the Gene Xpert with the results of MGIT culture

	Positive	**Negative**	**No. of Patients**
MGIT CULTURE	43	57	100
GENE Xpert	26	74	100

MGIT culture of pleural biopsy sample is a better diagnostic modality as compared to the Gene Xpert assay for diagnosis of tubercular pleural effusion(p=0.01578).

Table 3: Comparison of the Gene Xpert with the results of Histopathology

	Positive	**Negative**	**No. of Patients**
Histopathology	61	39	100
GENE Xpert	26	74	100

Histopathology of pleural biopsy sample is a better diagnostic modality as compared to the Gene Xpert assay for diagnosis of tubercular pleural effusion(p=0.015).

4. DISCUSSION

The main presenting symptoms of our enrolled patients were cough (52%), pleuritic chest pain (55%), shortness of breath (8%), fever (42%), loss of appetite (35%), and loss of weight (39%). Le Palud et al (2014) found in a similar type of study, cough (52%) as the main symptom followed by general symptoms (45.1%). [7]

Pleural fluid Gene Xpert was positive in only twelve percent of our cases of pleural effusion. Pleural fluid culture for Mycobacterium tuberculosis by MGIT was found positive in twenty one percent of cases. Thus, Gene Xpert had a sensitivity of 57% and specificity of 100% against culture in pleural fluid. Denkinger et al (2014) in a meta-analysis of studies of Gene Xpert in pleural fluid reported a pooled sensitivity of 46.4% against culture and 21.4% against composite reference standard. Gene Xpert pooled specificity was consistently 98.7% against composite reference standard across different sample types.[8]

In majority of our patients AFB were not seen in pleural biopsy direct smear microscopy as only eight percent were positive for AFB. Jinghui et al (2015) found in pleural biopsy specimens, AFB microscopy was positive in 15 patients (11.9%).[6] Sensitivities of smear

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE8, 2023

microscopy were found to be 61% (91/150 specimens) among patients with positive cultures and 51% (145/283) among patients with a positive Composite Reference Standard.[6]

Forty-three percent our patients has Mycobacterium tuberculosis colony growth in MGIT culture after incubation of pleural biopsy sample. Jinghui et al (2015) found in his study Fifty-five (43.7%) of 126 participants met the diagnostic standard of pleural tuberculosis, defined as pleural biopsy specimens that had positive culture results. In pleural biopsy specimens LJ culture was positive in 40 patients (31.7%) and MGIT culture was positive in 51 patients (40.5%).[6]

Sixty-one percent of our patients had granulomatous lesions in pleural biopsy samples. According to various studies, diagnostic yield of closed pleural biopsy in tubercular pleural effusion ranges from 60 to 95%. In one of the largest reviews of 2500 pleural biopsies, Tomlinson et al reported a diagnostic yield of closed pleural biopsy is 75% for Pleural tuberculosis.[9] Suri et al reported that three serial pleural biopsies increase the yield from 60% to 93%.[10]

In our study, pleural biopsy Gene Xpert assay was found positive in twenty six percent cases of pleural biopsy. Among these, four cases were rifampicin resistant. Gene Xpert of pleural biopsy sample is a better diagnostic modality as compared to the direct smear examination of pleural biopsy for diagnosis of tubercular pleural effusion (p=0.00035). Also, Gene Xpert assay of pleural biopsy sample is a better diagnostic modality as compared to the Gene Xpert assay of pleural fluid for diagnosis of tubercular pleural effusion (p=0.00587). Vadwai et al in 2011, concluded that Gene Xpert MTB/RIF assay not only has good sensitivity and specificity for the diagnosis of tuberculosis and detection of RIF resistance in EPTB but also perfectly fits the requirements of the Indian health care setting.[11]

However, MGIT culture and Histopathology examination of pleural biopsy sample are better diagnostic modality as compared to the Gene Xpert assay for diagnosis of tubercular pleural effusion (p=0.0157 & 0.0015 respectively). The sensitivity and specificity of the Gene Xpert MTB/RIF assay in pleural biopsy against culture were 70% and 100% respectively. Against the histopathological examination, the sensitivitity and specificity of Gene Xpert were 57% and 100% respectively. The sensitivity and specificity of the Gene Xpert MTB/RIF assay in pleural biopsy against our Composite Reference Standard were 26% and 100% respectively.

5. CONCLUSION

Pleural biopsy Gene Xpert assay was found positive in 26% cases; among these, four cases were rifampicin resistant. The sensitivity and specificity of the Gene Xpert MTB/RIF assay in pleural biopsy against culture were 70% and 100% respectively.

This study demonstrates that Gene Xpert MTB/RIF assay performs well in biopsy specimens for rapid and accurate diagnosis of tubercular pleural effusion.

6. REFERENCES

1. Porcel JM. Tuberculous pleural effusion: Lung. 2009;187:263-70.
2. Tortoli E, Russo C, Piersimoni C, Mazzola E, Dal Monte P, Pascarella M, et al. Clinical validation of Xpert MTB/RIF for the diagnosis of extrapulmonary tuberculosis. Eur Respir J 2012; 40: 442-7.
3. Porcel JM, Palma R, Valdes L, Bielsa S, San-Jose E, Esquerda A. Xpert MTB/RIF in pleural fluid for the diagnosis of tuber¬culosis. Int J Tuberc Lung Dis 2013;17:1217-9.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE8, 2023

4. Friedrich SO, von Groote-Bidlingmaier F, Diacon AH. Xpert MTB/RIF assay for diagnosis of pleural tuberculosis. J Clin Microbiol 2011;49:4341-2.
5. WHO: Xpert MTB/RIF for the diagnosis of pulmonary and extrapulmonary tuberculosis- policy update: Geneva,2013:22-23.
6. Jinghui Du, Zikun Huang, Qing Luo, Guoliang Xiong: Rapid diagnosis of pleural tuberculosis by Xpert MTB/RIF assay using pleural biopsy and pleural fluid specimens: J Res Med Sci. 2015; 20: 26–31.
7. Le Palud, Vincent Cattoir, Brigitte Malbruny: Retrospective observational study of diagnostic accuaracy of the Expert MTB/RIF assay on fiberoptic bronchoscopy sampling for early diagnosis of smear-negative or sputum-scarce patients with suspected tuberculosis: BMC Pulm Med.2014;14:137.
8. Claudia M. Denkinger, Samuel G. Schumacher: Xpert MTB/RIF assay for the diagnosis of extrapulmonary tuberculosis: a systematic review and meta-analysis: ERJ Express. 2014.
9. Tomlinson JR, Sahn SA. Invasive procedures in the diagnosis of pleural disease. Semin Respir Med 1087; 9:30–36.
10. Suri JC, Goel A, Gupta DK, Bhatia A. Role of serial pleural biopsies in the diagnosis of pleural effusion. Indian J Chest Dis Allied Sci 1991; 33:63-7.
11. Vadwai V, Boehme c, Nabeta P, Shetty A, Alland D, Rodrigues C. Xpert – MTB / RIF, A new pillar in the diagnosis of extra pulmonary tuberculosis. J Clin Microbiol. 2011; 49: 2540 – 45.