

## Prevalence of Positivity of CBNAAT (Cartridge Based Nucleic Acid Amplification Test) in Extra-Pulmonary Tuberculosis

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### Abstract

### Original Research Article

**Introduction:** Tuberculosis (TB) remains a key challenge in the face of global public health and inadequate diagnostic assays have hampered our chances to tackle this disease effectively. The Gene Xpert MTB/RIF assay marks an important development in the field of rapid molecular TB diagnostics. This study was done to see the prevalence of gene Xpert MTB/RIF assay and drug resistant tuberculosis in extrapulmonary tuberculosis. **Material and methods:** The 300 samples of extra-pulmonary tuberculosis constituting pleural fluid, pus, CSF, lymph tissue, peritoneal fluid diagnosed on the basis of clinico radiological and/or histopathological findings were sent for gene Xpert MTB/RIF. **Results:** Maximum number of patients in our study are tubercular pleural effusion (67.7%) followed by tubercular lymphadenitis, empyema, Cerebrospinal fluid, ascitic fluid and pericardial fluid. Mtb had been detected in pleural effusion (13.8%), lymphadenitis (60.3%), empyema (44.4%) and ascitic fluid (11.1%). 16.7% cases were diagnosed as multi drug resistant –extrapulmonary tuberculosis (MDR-EPTB). **Conclusion:** Gene Xpert assays a more sensitive technique as compared to conventional methods. The Gene Xpert MTB/RIF assay marks an important development in the field of rapid molecular TB diagnostics.

**Keywords:** CBNAAT, Extra-Pulmonary Tuberculosis

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## INTRODUCTION

TB is the ninth leading cause of death worldwide and the leading cause from a single infectious agent, ranking above HIV/AIDS. It is estimated that 15 to 20% of all TB cases are extra pulmonary mainly affecting the lymph nodes, meninges, kidney, spine and growing ends of the bones[1]. GeneXpert MTB/RIF assay has an overall sensitivity of 88% and a pooled specificity of 98% as compared to culture [2]. These characteristics make it a potentially useful technique in the diagnosis of EPTB as well. This study was done to see the prevalence of gene Xpert MTB/RIF assay in extrapulmonary tuberculosis and the prevalence of drug resistant tuberculosis by Xpert MTB/RIF assay in extra-pulmonary tuberculosis

## MATERIAL AND METHODS

It is a prospective observational study conducted in kamla Nehru chest hospital, Dr S N Medical College Jodhpur, a tertiary care center for respiratory diseases in western part of Rajasthan, India. 300 cases of extra-pulmonary tuberculosis like pleural effusion, cold abscess, meningitis, lymphadenopathy, ascites diagnosed on the basis of clinico radiological and/or histopathological findings were included. Cytology, biochemistry, microbiological analysis and geneXpert were done.

## RESULTS

Out of 300 samples, 203 (67.7%) were pleural fluid, 58 (19.3%) were lymph node aspirate, 18 (6%) were empyema, 9 (3%) were CSF, 9 (3%) were ascitic fluid and 3 (1%) were pericardial fluid. two third of our patients were below 45 year of age and males were

predominantly affected. Approximately two third of patients had duration of illness less than one year and predominant symptom in our study is fever Followed by weight loss, cough, chest pain, shortness of breath. More than half patients had no previous history of ATT. Smoking is the predominant substance abuse and most common occupation are stonemason Followed by housewife, manual labourer .Most common morbidity

was DM followed by COPD and hypothyroidism. In tubercular pleural effusion, tubercular lymphadenitis, empyema and ascitic fluid, Mtb had been detected in 28 (13.8%), 35(60.3%), 8(44.4%) and 1(11.1%) cases respectively. None of the CSF sample had Mtb detected (figure no.1). In our study 16.7% cases were diagnosed as multi drug resistant –extrapulmonary tuberculosis (MDR-EPTB) (Figure no.2).

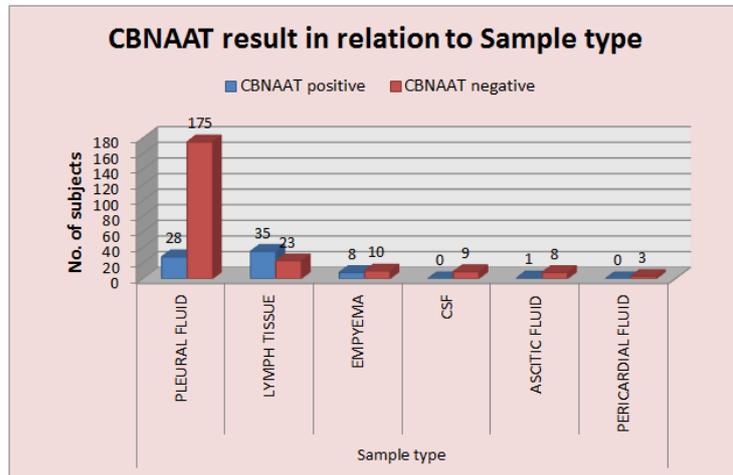


Fig-1: Cbnaat result in relation to sample type

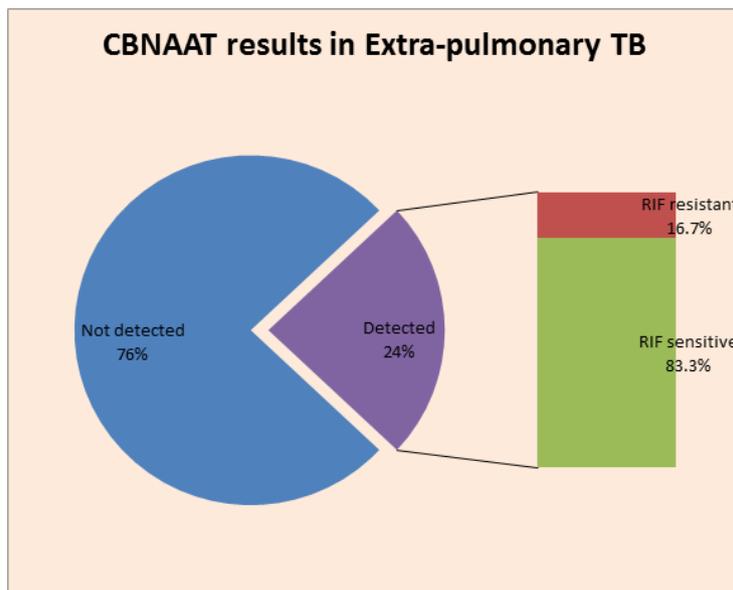


Fig-2: Distribution of study population according to CBNAAT result

## DISCUSSION

Tuberculosis (TB) remains a key challenge in the face of global public health and inadequate diagnostic assays have hampered our chances to tackle this disease effectively [3]. As the number of bacilli are very less in extra-pulmonary samples and because of

difficulty in obtaining tissues from deep seated organs; diagnosis is delayed in most cases. The Gene X-pert MTB/RIF assay marks an important development in the field of rapid molecular TB diagnostics. Comparative analysis of different studies is shown in Table no.1.

**Table-1: Comparative analysis of different studies**

	MTB detected (%)			Rif resistance (%)
	Pl fluid	LNTB	Ascitic fluid	
Pravin <i>et al.</i> [9]	10.1	-	9.3	19.2
Avashia S <i>et al.</i> [11]	23.3	54.2	20	5.4
Ahmed naeem sajed <i>et al.</i> [4]	15.8	-	6.3	-
Uria GA <i>et al.</i> [5]	32	-	27.8	-
Hillemann D <i>et al.</i> [6]	2.9	-	-	4
Shukla <i>et al.</i> [15]	20.58	-	-	21
Our study	13.8	60.3	11.1	16.7

In the study by Ahmad Naeem Sajed *et al.* [4], Out of 100, 37% patients were Gene Xpert MTB/RIF Assay positive. MTB was detected in 51.7% Pus samples, 15.8% Pleural fluid samples, 6.3% Ascitic fluid samples and 40.0% CSF samples. In a study by Uria GA *et al.* [5] from India the positivity rate with GeneXpert assay was 24.6% for CSF, 32% for pleural fluid and 27.8% for ascitic fluid. Hillemann *et al.* [6] found 3 positive Gene Xpert results out of 113 pleural fluid samples (2.9%) all of which were negative on mycobacterial culture. In other study by Shagufta Iram *et al.* [7] from Pakistan, Nine out of 19 pus samples (47.3%) were positive for MTB by Gene Xpert.

Amol B Fuladi *et al.* [8] Out of 108 extra pulmonary tuberculosis cases, 7 case of TB meningitis were present. None of the CSF samples was reported MTB positive out of 7 sample by Xpert MTB/RIF. In the study by Pravin KN *et al.* [9] out of 378 smear-negative body fluid specimens, 32 were positive for MTB of which 5 specimens also exhibited resistance to RIF. This indicates 19.2% of MTB positives were also multi-drug resistant (MDR-TB). In the study by bag *et al.* [10] the rifampicin resistance was seen among 11 % of pulmonary and 38% of extra-pulmonary specimens from the tertiary care centre in Mumbai, India.

Avashia S *et al.* [11] examined 300 various extra-pulmonary samples from suspected extrapulmonary tuberculosis and out of it MTB was detected in 111 samples and 105 samples were rifampicin sensitive and 6 samples were rifampicin resistant (5.40%). Hillman D *et al.*[12] tested 29 strains, all were found to be susceptible to Rifampicin. Of the isolates positive by Xpert testes, 3 of 29 (10.3%) had an indeterminate Rifampicin resistance result. For the remaining 26 samples, 25 were found to be susceptible and 1 (4%) was found to be resistant. In the study by Soma Chakraborty *et al.*[13] out of the 240 extrapulmonary samples 13 (5.41%) were positive for AFB by ZN staining and 23 samples (9.2%) were stain and culture positive for Acid fast bacilli as well as detected as positive for Mycobacterium tuberculosis on Gene Xpert. 2 (8.69%) out of 23 GeneXpert positive extra-pulmonary samples were found to be Rifampicin resistant.

Richa Kumari *et al.*[14] from Banaras, U.P. got a higher prevalence of 27.45% MDR-EPTB in their

study. Amarendra kumar shukla *et al.*[15] studied 136 patients of pleural effusion. In 20.58 % (28) patients, Mycobacterium tuberculosis was detected and out of these, 21% (6) had rifampicin resistance. In Inderpalsingh sehgal *et al.* study,[16] the pooled sensitivities and specificities of Xpert MTB/RIF were 51.4% and 98.6% respectively, with culture used as a reference standard and 22.7% and 99.8% respectively, with a composite reference standard (CRS) used as the benchmark.

## CONCLUSION

Our study revealed that more positivity rate by Gene Xpert in comparison to ZN staining in pleural fluid which indicates that it is a more sensitive technique as compared to conventional methods. It also detects resistance to Rifampicin which we would have missed with ZN staining or by other conventional methods. To conclude, Gene Xpert assay has the potential to significantly improve and escalate the diagnosis of smear negative body fluid specimens at both hospitals as well as point-of-care settings in regions not only with high TB burden but also with overlapping HIV. Also detection of Rifampicin resistance aids in prompt initiation of appropriate therapy and thus improving the overall quality of TB care.

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