http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v14i01.08

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

CBNAAT Emerging as Rapid molecular Diagnostic tool in Pulmonary & Extrapulmonary T.B.

Authors
Dr. Ganesh Kumar[1], Dr. (Prof). Ajay Kumar[2]
[1]Associate Professor, S.N.M.M.C. Dhanbad
[2]Professor on contract, S.N.M.M.C. Dhanbad

Abstract
Cartridge Based Nucleic Acid Amplification test is a rapid molecular diagnostic tool which has revolutionized the TB diagnosis. Glod Standard of TB diagnosis is demonstration of M.TB either on microscopy or culture / Line Probe Assay Rapid. Rapid detection of M.TB by this method has replaced the microscopy / culture etc. Rifampicin resistance detection is extra advantage of this method. Our studies conforms with other studies in India.
Keywords: CBNAAT, Tuberculosis, Pulmonary TB, Extrapulmonary TB, Molecular diagnosis.

Introduction

Tuberculosis is a major health problem in India. Extrapulmonary tuberculosis makes up about 15-20 % of all T.B. cases but his number may climb up to 35-40 % among those whose immune systems are compromised such as person living with HIV or undergoing certain medical treatment. Extrapulmonary can be difficult to detect & treat. Lymph nodes sometimes presenting with swollen glands, persistent fever & weight loss.

The gold standard of T.B. diagnosis remains the demonstration of Acid-Fast Bacilli on smear microscopy or conventional culture on solid media (3-8 weeks) or broth media (1-2 weeks) & Line probe assay (LPA) typically takes 24-48 hours.

In recent years CBNAAT has emerged as a rapid molecular diagnostic tool for early accurate detection of T.B. & Rifampicin resistance. It has replaced the smear microscopy. Conventional diagnostic techniques such as ZN staining & microscopy lack sensitivity especially in paucibacillary & extrapulmonary T.B. while culture for M. TB is time consuming.

Incorporating CBNAAT, histopathology & AFB culture is best approach for diagnosis of extrapulmonary TB.

CBNAAT (Cartridge Based Nucleic Acid Amplification) has revolutionized TB diagnosis by offering.

- Rapid detection (Approx 2 hours only).
- High Sensitivity in paucibacillary sample.
- Detection of Rifampicin resistance.

Objective

To analyse the performance & diagnostic yield of CBNAAT in Pulmonary & Extrapulmonary T.B over a period of 35 months & compare our findings with previous published literatures.

Materials & Methods:

Study Design and Setting

A retrospective observational study was conducted at SNMMCH, Dhanbad, a tertiary care teaching hospital.

Study materials assessing – CBNAAT data generated FNAC lymph node, sputum for pulmonary samples, FNAC (Pus), Body fluids (Ascitic, Pleural. CSF, Bronchoalveolar lavage) samples received from OPD, inpatient & referred cases of suspected TB**.**

Study Duration – Jan -2023 – Nov -2025 (35 months) Sample size total – 15,159 cases
Pulmonary sample – Sputum. (13,838)
Extra Pulmonary sample – (1,321) FNAC for L. N. (Pus), Pleural Fluid, Ascitic fluid BAL & C.S.F.
Diagnostic Instruments – CBNAAT Machine with Reporting on computer.

Photo

Methods-

1) First we add sample reagent to fresh sputum in 2:1.
2) Shake it than let it stand for 10 minutes.
3) Shake then stand further for 5 minutes.
4) With pasteurl's pipette transfer the solution to cartridge. Then cartridge is loaded in cepheid GeneXpert machine.
5) In 2 hours, we saw the results on computer screen.

Results

In pulmonary samples out of 13,838 – 2,367 cases were positive 17.1 %. In Extra pulmonary TB- Out of 1,321 sample 206 week positive I.C 15.6 %.

Total 15,159 cases showed 2,573 I-C 16.9 % + Ve FNAC (Pus) Samples showed highest diagnostic yield.

Overall performance in our study aligns well with previously published data- Reinforcing its role as an essential diagnostic modality in routine TB work up.

Discussion

In our study positivity for pulmonary TB was 17.1 % which is comparable to previously published studies in India ranging from 15-25 %.

In Extrapulmonary TB- Positivity rate was slightly lower. It may be due to.

i. Lower bacillary load.
ii. Variable sample quality.
iii. Presence of PCR inhibitory in body fluid years wise distribution of +Ve cases of pulmonary TB showed gradual increase with highest number detected in Nov-2025. Year wise distribution of Extrapulmonary TB also showed progressive ride.

CBNAAT has emerged as a powerful diagnostic tool as it reduces diagnostic delay & helps in early treatment initiation due to ability to detect rifampicin resistance. Our Findings reinforce WHO recommendations advocating CBNAAT as a frontline diagnostic tool in TB endemic area.

Conclusion

CBNAAT is a reliable & rapid diagnostic tool for both pus & Extrapulmonary TB & particularly valuable in smear negative cases, early granulomatous lymphadenitis, cases requiring rapid rifampicin resistance screening. It offers significant advantages over conventional technique especially in paucibacillary cases.

References

1. World Health Organization. Automated real-time nucleic acid amplification technology for rapid and simultaneous detection of tuberculosis and rifampicin resistance. WHO; 2011.
2. Boehme CC, Nabeta P, Hillemann D, et al. Rapid molecular detection of tuberculosis and rifampin resistance. N. Eng. J. Med. 2010;363(11):1005–1015.
3. Lawn SD, Nicol MP. Xpert MTB/RIF assay: development, evaluation and implementation of a new rapid molecular diagnostic for tuberculosis and rifampicin resistance. Future Microbiol. 2011;6(9):1067–1082.
4. Armand S, Vanhuls P, Delcroix G, et al. Comparison of the Xpert MTB/RIF test with an IS6110-TaqMan real-time PCR assay for direct detection of Mycobacterium tuberculosis in respiratory and non-respiratory specimens. J Clin Microbiol. 2011;49(5):1772–1776.
5. Zeka AN, Tasbakan S, Cavusoglu C. Evaluation of the GeneXpert MTB/RIF assay for rapid diagnosis of tuberculosis and detection of rifampin resistance in pulmonary and extrapulmonary specimens. J. Clin. Microbiol. 2011;49(12):4138–4141.
6. Sharma SK, Kohli M, Yadav RN, et al. Evaluating the diagnostic accuracy of Xpert MTB/RIF assay in pulmonary tuberculosis. P. Lo. SOne. 2015;10(10):e0141011.
7. Denkinger CM, Schumacher SG, Boehme CC, et al. Xpert MTB/RIF assay for the diagnosis of extrapulmonary tuberculosis: a systematic review and meta-analysis. Eur. Respir. J. 2014;44(2):435–446.