EFFICACY OF CBNAAT Vs. AFB IN CYTOLOGY DIAGNOSIS OF TB

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Abstract - Cytology, Ziehl Neelsen staining and Mantoux test are conventionally used to test and treat tuberculosis. Cartridge Based Nucleic Acid Amplification Test (CBNAAT) is being now recommended for diagnosis of all tuberculosis. Aims and Objectives: To assess efficacy of various diagnostic tools for diagnosis of tuberculosis. Material and Methods: It was a prospective type of observational study conducted over a period of 18 months from April 2021 to November 2022, after obtaining institutional ethical committee approval. Patients who came to the department of Pathology for diagnosis of Tuberculosis with clinical features of tuberculosis or patients referred from other departments for initiation of Antitubercular Treatment (ATT), if aspiration of pus/cheesy material from lymph node were included in our study. Those patients with Positive serology for HIV, Fluactuant node, on ATT and excluded from study. After explaining the procedure and complications, written informed consent was taken from all patients. FNA was done by passing 18- or 20-Gauge needle into lymph node under two finger guidance, with suction applied, needle was moved back and for around 0.5-10 times. Procedure was repeated from same node or other node if material obtained was unsatisfactory. Material obtained was smeared for cytology and ZN staining and remaining aspirate was flushed with normal saline to empty contents in syringe and hub into Falcon’s tube for CBNAAT. If CBNAAT or Acid Fast Bacilli (AFB) in ZN stain smear turns negative, excision biopsy of easily approachable node was performed and histopathology was sought irrespective of cytology result. Diagnosis of Tuberculosis is established with positive CBNAAT/ AFB results were tabulated, analysed using SPSS Version 26 and expressed in mean, median and percentages.
RESULTS

A total of 282 patients underwent FNA and 22.83% were excluded from study due to aspiration of pus/cheesy material. Remaining 200 patients were included for study. Demographic details examination findings of included population are depicted in table one. Out of 200 patients 103(51.6%) had got MTB detected in CBNAAT and remaining 48.33% were subjected for excision biopsy. Demonstration of AFB by ZN stain was done in 15% cases and all of them were positive in CBNAAT. Two among 31 MTB detected samples in CBNAAT had Rifampicin resistance. Final diagnosis made after histopathology of excision biopsy is shown in table two. Results of Cytological features of FNA in relation to final diagnosis are depicted in table three. CBNAAT could not detect 20.51% (8/39) cases of Tuberculosis which were diagnosed by histopathology. CBNAAT detected Tuberculosis in (70.96%) cases which were missed by AFB smear and 16 cases missed by Cytology. Sensitivity, specificity, positive predictive value and negative predictive value of Cytology, ZN stain, Mantoux test, Elevated ESR and CBNAAT for diagnosis of Tuberculosis is shown in table four. Cytological finding correlated with final diagnosis (including Tuberculosis and other diagnoses) in 56.67 % (34/60) cases and final diagnosis was different from cytology in 43.33 % (26/60) cases.

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<th>Table 1: Demographic profile, clinical history and lymph node examination.</th>
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<td><strong>Mean age</strong></td>
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<td><strong>Gender</strong></td>
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<td><strong>Mean total duration of illness</strong></td>
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<td><strong>Symptoms of tuberculosis</strong></td>
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<td><strong>Past history of Tuberculosis</strong></td>
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<td><strong>Lymph node characteristics Number</strong></td>
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<td><strong>Tenderness</strong></td>
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<th>Table 2: Performance of various diagnostic techniques against composite diagnostic methods for diagnosis of TB</th>
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<td><strong>Sensitivity % (95% CI)</strong></td>
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<tr>
<td>Cytology</td>
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<tr>
<td>ZN stain</td>
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<tr>
<td>Mantoux Test</td>
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<td>Elevated ESR</td>
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<td>Histopathology</td>
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DISCUSSION
Our study population included majority of male gender and with mean age 28.42 years similar to other studies. Most common site for lymphadenopathy was cervical region, which could be due to pathogenesis of lymph node TB by spread of tuberculosis through lympho-hematogenous route from lungs and, cervical nodes drains major parts of lungs. On examination 55% of patients had mattedness and 60% had multiple lymph nodes. This could be explained by late presentation of patients to health care, by the time disease would have progressed to periaxialitis stage and beyond. Similar findings were noted by Nidhi et al who noted 40.7% tubercular patients had multiple lymph node and Saurabh et al reported 32.8% cases with matted node. In a study by Mengistu 16.5% had past history of tuberculosis, whereas our study population composed 26.67% patients with past tubercular treatment history, may be due to high tuberculosis burden in our country. Common predefined cytological features suggestive of tuberculosis are granulomatous inflammation, granulomatous inflammation with necrosis and only necrosis. Cytoology had modest sensitivity and specificity in our study. We noted 53.84% (21/39) of tubercular patients had granulomatous inflammation with or without necrosis. Two patients with granuloma were turnedout to be lymphoma in histology. Significant number of patients (26/60, 43.33%) had a cytological feature of reactive hyperplasia in our study. Out of 26, 15 (57.69%) turned out to be tuberculosis in either CBNAAT or histology. In a follow-up study by Ijaz conducted on nonspecific reactive hyperplasia of lymph nodes upon re-biopsies, showed 17% had Tuberculosis, 11% had lymphoma, 6% developed acute lymphadenitis and 27% of patients had persistent benign nonspecific hyperplasia. This emphasizes the need for early histology in cases of reactive hyperplasia. AFB smear had low sensitivity and negative predictive value with high specificity and positive predictive value and this is noted in other studies too and is due to paucibacillary nature of LNTB. Bacillary load increases as disease progress to necrotic stage and highest in purulentmaterial. In a study by Hemalatha et al. AFB positivity rate among different cytological features were noted as follows: granulomatous reaction- 21%, necrotising granulomatous- 55% and necrosis only-73.5%. Since we excludedpurulent or caseous samples from our study, naturally AFBsmear positivity rate will be reduced. Mantoux test (MT) is also used as an adjunct in diagnosis of tuberculosis in routine clinical practice, but is limited by low sensitivity, specificity, high false positive and negative rate. We noted 53.85% patients with tuberculosis had false negative MT and implies its limited value in diagnosis of tuberculosis. Also, in a study published by Anju Jain, only 54.6% of EPTB had MT positive. Similarly, elevation of ESR for diagnosing Tuberculosis is misleading. Performance of CBNAAT on suspected LNTB have been published with varying yields. Our study had sensitivity and specificity of 79.49% and 100% respectively which can be compared to a pooled results by two different meta-analysis of Guocan and Denkinger who found sensitivity and specificity of 80% & 96% and 81.2 & 99.1% respectively. Many studies reported sensitivity of CBNAAT >95% on lymph node specimens in those meta-analysis. Our study could be having lesser yield due to the exclusion
of purulent aspirations. A study by Megintsu et al. had a difference in CBNAAT positive rate among hemorrhagic, caseous and purulent aspirates, yielding only 20% (12/60) CBNAAT positivity in hemorrhagic aspirates and 68.4% (63/92) in caseous and purulent aspirates. Our study had CBNAAT positive rate of 79.89% (31/39) despite inclusion of only non-caseous or non-purulent material for CBNAAT. This relative higher yield is may be due to microscopic necrosis which grossly doesn’t look likepus or may be due to technical differences like using wide bore needle (we used 18- or 20-gauge needle instead of traditional 22 gauge needle) for aspiration with more number of needle strokes or repeat sampling. One of the limitations of our study is not conducting culture of mycobacterium on aspirated material or biopsy specimen.

Conclusion
CBNAAT is an effective tool for diagnosing tuberculosis. We recommend to perform excision biopsy of lymph node in feasible centers if CBNAAT or AFB smear is negative, irrespective of cytological features suggesting tuberculosis.

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None.

Conflict of Interest
None.

REFERENCES: