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Prevalence of Cervical Tuberculous Lymphadenopathy in Patients Presenting with Neck Swelling: A Retrospective Study

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ABSTRACT

Background: Cervical lymphadenopathy is a frequent clinical finding and can be caused by a variety of infectious, inflammatory, and neoplastic conditions. TCLA is an important health problem in TB endemic areas, with painless swelling of the neck as a common presentation. The prevalence of cervical tuberculous lymphadenopathy in patients with neck swelling and its demographic and clinical features were studied in a retrospective manner.

Methods: This study is a retrospective observational study that was conducted in patients presenting with neck swelling and who were evaluated for cervical lymphadenopathy. Demographic, clinical and diagnostic data was obtained from the hospital records. Patients with the diagnosis of cervical tuberculous lymphadenopathy were identified on the basis of cytology, histopathological, microbiological or molecular investigations. The prevalence of cervical tuberculosis was calculated, and clinical and demographic data available were analyzed descriptively.

Results: Among 268 patients with neck swelling, 66 (24.6%) had confirmed CTL. CBNAAT was positive in 54 (81.8%), while HPE confirmed 23 (34.8%). Females predominated (63.6%; F:M 1.75:1), with a mean age of 31.2 years; the 21–30-year group was most affected (31.8%). Unilateral swelling predominated (87.9%), and Level V was the most frequently involved nodal site (51.5%), followed by Level III (21.2%).

Conclusion: CTL constituted nearly one-fourth of patients presenting with neck swelling, with a clear female and young-adult predominance. Level V was the most commonly affected nodal site, while CBNAAT demonstrated high diagnostic yield, supporting its clinical utility in CTL diagnosis.

Key-words: Cervical lymphadenopathy, Tuberculosis, Tuberculous lymphadenitis, Neck swelling, Cervical tuberculosis, Retrospective study, Lymph node

INTRODUCTION

Tuberculosis (TB) remains an important cause of morbidity in India, and its extrapulmonary manifestations continue to the present of diagnostic challenges. Extrapulmonary tuberculosis accounts for approximately 15–20% of TB cases in immunocompetent individuals, with peripheral lymph node tuberculosis representing the most frequent extrapulmonary form [1-3]. Cervical lymph nodes are particularly commonly involved and may constitute the first or only clinically evident manifestation of disease. In patients presenting with a neck swelling, tuberculous cervical lymphadenopathy (CTL) therefore remains an important diagnostic consideration, particularly in high-burden settings.

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Clinically, CTL commonly presents as a slowly enlarging, painless cervical swelling and may involve a single node or multiple matted nodes. Posterior-triangle and supraclavicular involvement are frequently described [4]. However, the clinical presentation is not specific. Tuberculous lymphadenitis may resemble reactive lymphadenopathy, metastatic carcinoma, lymphoma, or other infectious lymphadenitides [5]. The absence of constitutional or respiratory symptoms does not exclude the disease, because cervical lymphadenopathy may occur in isolation without demonstrable pulmonary involvement. This overlap makes timely tissue-based diagnosis important for appropriate treatment and for avoiding unnecessary diagnostic delay.

Fine-needle aspiration cytology (FNAC) is widely used as an initial investigation because it is minimally invasive, readily available, and can demonstrate characteristic epithelioid granulomas with or without caseous necrosis [6]. Molecular testing, such as cartridge-based nucleic acid amplification testing (CBNAAT) can provide additional microbiological evidence and may also identify rifampicin resistance. Histopathological examination (HPE) remains valuable when FNAC is inconclusive, particularly when aspirates contain necrotic or nonspecific material. The complementary use of clinical assessment, ultrasonography, cytology, molecular testing, and histopathology can therefore improve diagnostic confidence.

Earlier Indian studies have reported substantial variation in the proportion of cervical tuberculosis among patients evaluated for neck swellings, with differences related to study population, referral patterns, diagnostic criteria, and whether patients were selected because of a prior clinical suspicion of tuberculosis [7,8]. Contemporary data from routine ENT outpatient populations remain comparatively limited. Establishing the current burden and describing the demographic, clinical, anatomical, and diagnostic characteristics of CTL can help clinicians maintain an appropriate level of suspicion and select appropriate investigations.

The present retrospective study was undertaken to determine the prevalence of tuberculous cervical lymphadenopathy among patients presenting with neck swelling to the ENT outpatient department at GMERS Medical College & Hospital, Gotri, Vadodara, during 2025. The study also evaluated the demographic and clinical profile of affected patients, the anatomical distribution of cervical lymphadenopathy, and the diagnostic contribution of FNAC, CBNAAT, ultrasonography, and HPE.

MATERIALS AND METHODS

Research Design- This was a retrospective observational study conducted in the Department of Otorhinolaryngology at GMERS Medical College & Hospital, Gotri, Vadodara. The study period extended from January 2025 to December 2025. Records of all patients presenting to the ENT outpatient department with neck swelling during the study period were reviewed. A total of 268 patients were included consecutively. The study was approved by the Institutional Ethics Committee.

Inclusion Criteria

- All patients presenting with neck swelling to the ENT outpatient department during the study period from January 2025 to December 2025.

Exclusion Criteria

- Patients with a known primary malignancy.
- Patients with an obvious malignant growth of the head and neck region.
- Pregnant women.

Procedure- Relevant demographic and clinical information were retrieved from the medical records. The variables assessed included age, sex, residence, duration of neck swelling, and associated symptoms such as fever, weight loss, malaise, cough, sinus, and haemoptysis. A history of tuberculosis and family history of tuberculosis were also recorded. Clinical examination documented the site, size, number, consistency, and matting of cervical lymph nodes, together with the presence of cold abscess or discharging sinus.

Ultrasonography of the neck was performed to assess lymph-node morphology and architecture and to assist in selecting the site for FNAC. FNAC was performed under aseptic conditions using a 22- or 23-gauge needle. Smears were stained with Giemsa and Papanicolaou stains and evaluated cytologically. FNAC was considered suggestive of tuberculosis when epithelioid cell granulomas with or without caseating necrosis were identified. Reactive or nonspecific lymphadenitis was considered inconclusive.

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Where adequate aspirated material was available, CBNAAT was performed to detect Mycobacterium tuberculosis DNA and assess rifampicin resistance. Excision biopsy of a representative lymph node was undertaken when FNAC was inconclusive despite persistent clinical suspicion, when clinically or ultrasonographically indicated because of cold abscess or sinus formation, or when neck swelling persisted after an initial nondiagnostic FNAC. Excised lymph nodes were fixed in 10% formalin, processed by paraffin embedding, and stained with haematoxylin and eosin. HPE was considered positive when granulomatous inflammation with caseating necrosis and/or Langhans giant cells was demonstrated.

Additional investigations included a posteroanterior chest X-ray in all patients to identify evidence of active or healed pulmonary tuberculosis. ESR was measured by the Westergren method, with a value greater than 30 mm in the first hour considered elevated. Mantoux testing was performed in selected patients when clinically indicated using 0.1 mL of 1 TU PPD RT-23, with induration of at least 10 mm after 72 hours recorded as positive. Sputum CBNAAT or AFB smear was obtained in patients with respiratory symptoms or abnormal chest X-ray findings.

For the purposes of the study, tuberculous cervical lymphadenopathy was confirmed when at least one of the following was present: FNAC demonstrating epithelioid cell granulomas with or without caseating necrosis; HPE demonstrating granulomatous inflammation with caseation and/or Langhans giant cells; or CBNAAT detecting Mycobacterium tuberculosis in FNAC material or a tissue sample. Patients diagnosed with CTL were registered under the National Tuberculosis Elimination Programme and treated with category I anti-tubercular therapy (2HRZE/4HR). Patients with cold abscess or discharging sinus underwent incision and drainage or therapeutic lymph-node excision when required. Recurrence was defined as reappearance of cervical lymphadenopathy after completion of anti-tubercular therapy.

Statistical Analysis- Data were entered into Microsoft Excel and analysed using descriptive statistics. Categorical variables were presented as frequencies and percentages. Continuous variables, including age and duration of symptoms, were expressed as mean values with ranges. The prevalence of tuberculous cervical lymphadenopathy was calculated as the proportion of confirmed CTL cases among all patients presenting with neck swelling during the study period.

RESULTS

A total of 268 patients presenting with neck swelling were enrolled in the study. Of these, 66 patients (24.6%) were confirmed to have tuberculous cervical lymphadenopathy (CTL). Among these 66 confirmed cases, histopathological examination (HPE) of excised lymph nodes was positive in 23 patients (34.8% of CTL cases; 8.6% of all neck swellings). The remaining 43 patients were diagnosed by FNAC with or without CBNAAT, without requiring excision biopsy. CBNAAT performed on FNAC material was positive in 54 out of 66 patients (81.8%) (Fig. 1).

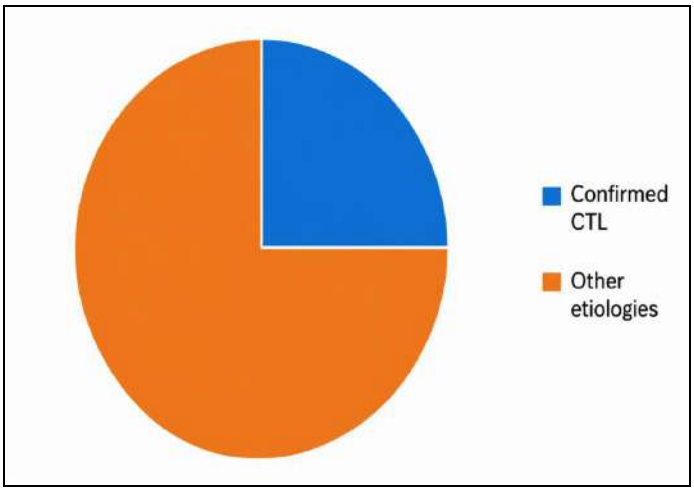


Fig. 1: Prevalence of tuberculous cervical lymphadenopathy among patients presenting with neck swelling (n=268)

The demographic profile of the 66 CTL patients showed a female predominance, with 42 females (63.6%) and 24 males (36.4%), giving a female-to-male ratio of 1.75:1. The mean age was 31.2 years (range: 8 to 73 years). The most commonly affected age group was 21-30 years, accounting for 21 patients (31.8%), followed by 11-20 years with 13 patients (19.7%), and 31-40 years with 12 patients (18.2%). Children aged 10 years or younger comprised 6.1% (4 patients), while those above 60 years also accounted for 6.1% (4 patients) (Fig. 2 & Fig. 3).

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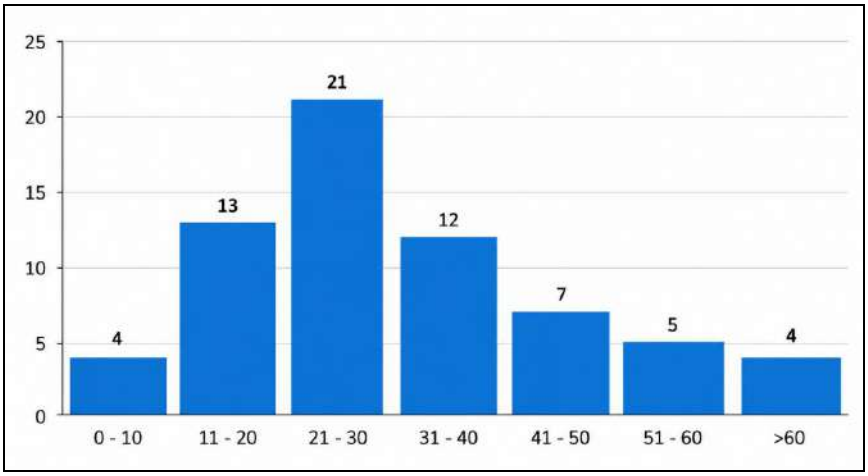


Fig. 2: Age distribution of patients with tuberculous cervical lymphadenopathy (n=66)

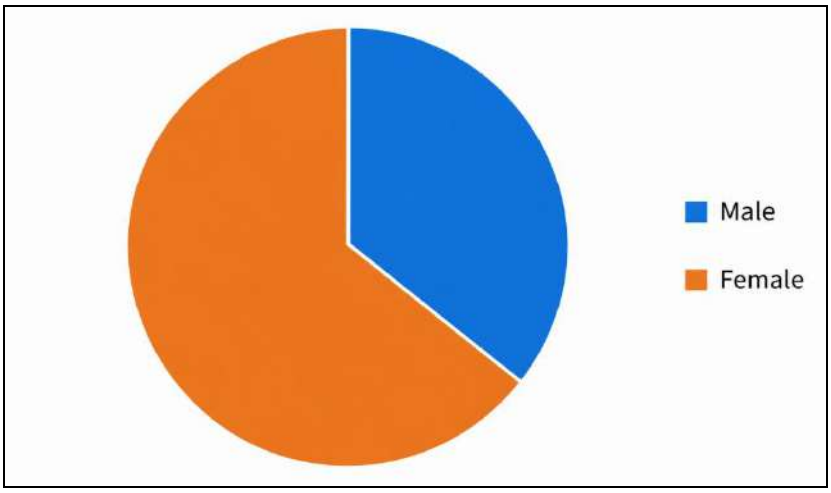


Fig. 3: Sex distribution of CTL patients showing female predominance (F:M = 1.75:1)

All 66 patients presented with neck swelling as their chief complaint. The mean duration of symptoms prior to presentation was 2.5 months, ranging from 7 days to 8 months. Associated systemic symptoms included malaise in 21 patients (31.8%), weight loss in 17 patients (25.8%), fever in 15 patients (22.7%), cough in 8 patients (12.1%), discharging sinus in 6 patients (9.1%), and hemoptysis in 2 patients (3.0%). Unilateral neck swelling was observed in 58 patients (87.9%), while bilateral involvement was seen in 8 patients (12.1%). Among unilateral cases, the right side was affected in 37 patients (56.1%) and the left side in 21 patients (31.8%). Regarding the anatomical level of cervical lymph node involvement, Level V (posterior triangle) was the most frequently involved, seen in 34 patients (51.5%). Other levels involved were Level III in 14 patients (21.2%), Level II in 7 patients (10.6%), Level IV in 6 patients (9.1%), Level I in 5 patients (7.6%), and Level VI in 4 patients (6.1%), with some patients having multiple levels affected (Fig. 4).

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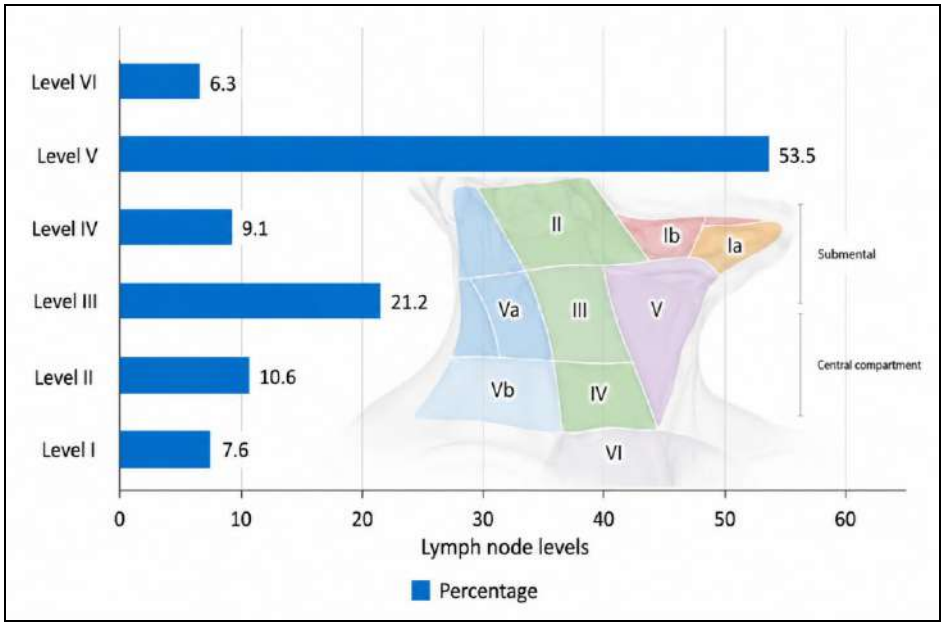


Fig. 4: Morphological patterns of tuberculous cervical lymph nodes on clinical and ultrasonographic examination

DISCUSSION

On clinical and ultrasonographic examination, the morphology of involved lymph nodes was described as multiple matted nodes in 39 patients (59.1%), multiple discrete nodes in 18 patients (27.3%), and a single discrete node in 9 patients (13.6%). Cold abscess formation was present in 14 patients (21.2%), and a discharging sinus was noted in 6 patients (9.1%) [9]. Laboratory investigations revealed that ESR was elevated (>30 mm in the first hour) in 59 out of 66 patients (89.4%). Chest X-ray showed evidence of active pulmonary tuberculosis in only 7 patients (10.6%). Among the 30 patients who had respiratory symptoms and underwent sputum CBNAAT or AFB smear, 4 patients (13.3%) tested positive. A family history of tuberculosis was present in 6 patients (9.1%), and comorbidities included hypertension (4 patients), diabetes mellitus (3 patients), and both conditions (1 patient). All 66 patients were registered under the National Tuberculosis Elimination Programme (NTEP) and started on category I anti-tubercular therapy (2HRZE/4HR). Surgical interventions were required in a subset of patients: incision and drainage of cold abscess was performed in 10 patients (15.2%), diagnostic excision biopsy in 23 patients (34.8%), and therapeutic lymph node excision in 3 patients (4.5%). Clinical improvement was observed in all patients by 6-8 weeks of starting ATT. Recurrence of cervical lymphadenopathy was noted in 3 patients (4.5%), all of whom had irregular treatment adherence.

In the present study, we found that tuberculous cervical lymphadenopathy accounted for 24.6% of all patients presenting with neck swelling to the ENT outpatient department. This prevalence is consistent with the high burden of extrapulmonary tuberculosis in India, where cervical lymph nodes remain the most common site of involvement. Our finding is slightly lower than the 38.46% reported by Patel [8] and substantially lower than the 63% reported by Jha *et al.* [7]; these differences may be explained by varying study populations – our study included all patients with neck swelling irrespective of clinical suspicion, whereas Jha *et al.* specifically selected patients with suspected tuberculosis. The corrected prevalence of 24.6% based on FNAC confirmation provides a realistic estimate of the burden of CTL in a general ENT OPD setting.

The female predominance observed in our study (63.6% females; female:male ratio 1.75:1) aligns closely with previous Indian studies. Yashveer and Kirti [6] reported a ratio of 1:1.97 (approximately 2:1 female predominance), while Dandapat *et al.* [9] and Subrahmanyam [10] reported ratios of 1:1.2 and 1:1.3, respectively. This consistent female preponderance has been attributed to several factors, including poorer nutritional status of females in male-dominated societies, limited sunlight exposure due to cultural practices such as the 'purdah system' (veiling), and possibly delayed healthcare-seeking behaviour among females [6,11-13]. The mean age of 31.2 years and peak incidence in the 21- 30-year age group (31.8%) are also in

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keeping with the literature. Das *et al.* [11] found the 15-24-year age group to be most commonly affected (40% of cases), and Khajanchi *et al.* [14] reported that CTL predominantly affects young and middle-aged adults, with decreasing incidence in older age groups.

Unilateral neck swelling was seen in 87.9% of our patients, with right-sided predominance (56.1%). This finding is almost identical to Patel's study [8], which reported unilateral involvement in 90% of patients, and to Fontanilla *et al.* [5], who noted unilateral presentation in 85% of cases. The most frequently involved lymph node group was Level V (posterior triangle), accounting for 51.5% of cases. This anatomical predilection has been consistently reported in the literature: Patel [8] found Level V involvement in 52% of cases, Chaudhary et al. [12] also reported Level V as the commonest site. The reason for this pattern may relate to the lymphatic drainage of the upper respiratory tract and the typical route of haematogenous or lymphatic spread of Mycobacterium tuberculosis.

A key finding of our study is that histopathological examination was required for diagnosis in 23 out of 66 confirmed CTL patients (34.8%), because FNAC was inconclusive (showing only reactive or necrotic material). This proportion is higher than the 14.3% reported by Yashveer and Kirti [6], possibly due to differences in the threshold for performing biopsy or a higher proportion of advanced cases with extensive necrosis in our series. Nevertheless, it underscores an important clinical reality: a negative or non-diagnostic FNAC does not exclude tuberculosis. As recently emphasised by Mogoanta *et al.* [13] in their series of head and neck EPTB cases, surgical biopsy remains an essential diagnostic tool when clinical suspicion is high, particularly in regions with high TB prevalence. In all our 23 biopsied cases, HPE revealed classical caseating granulomas with epithelioid cells and Langhans giant cells, providing a definitive diagnosis.

The diagnostic utility of CBNAAT in our study was high, with 81.8% of FNAC samples testing positive for *M. tuberculosis* DNA. This molecular method offers the advantages of rapid turnaround time (approximately 2 hours) and simultaneous detection of rifampicin resistance. Our positivity rate is comparable to that reported by Sekar *et al.* [14] and supports the use of CBNAAT as an adjunct to cytology, especially in samples with low bacillary load or necrotic debris where AFB smear may be negative.

Only 10.6% of our CTL patients had chest X-ray findings suggestive of active pulmonary tuberculosis, and sputum positivity was present in only 13.3% of those tested. This low rate of concomitant pulmonary involvement is characteristic of isolated extrapulmonary tuberculosis and has been reported by others: Yashveer and Kirti [6] found chest radiographs suggestive of TB in 13.3% of their cases, and Mogoanta *et al.* [13] reported no pulmonary involvement in their nine cases of head and neck EPTB. This finding has an important clinical implication: the absence of respiratory symptoms or a normal chest X-ray should never be used to rule out tuberculous cervical lymphadenopathy in an endemic setting. Clinicians must maintain a high index of suspicion based on the neck examination alone.

The management outcomes in our series were favourable, with all patients showing clinical improvement within 6-8 weeks of initiating standard anti-tubercular therapy. The recurrence rate of 4.5% (3 patients) occurred exclusively in those with irregular treatment adherence, reinforcing the importance of directly observed therapy (DOT) under the NTEP program. Surgical intervention, including incision and drainage of cold abscesses and excision biopsy, played a complementary role in diagnosis and in managing complications, but did not replace medical therapy. This is consistent with the consensus that anti-tubercular chemotherapy is the mainstay of treatment for CTL.

Our study has several limitations. It is a single-centre study, which may limit generalizability to other regions with different TB epidemiology. HIV status was not routinely tested; co-infection with HIV can alter the clinical presentation and diagnostic yield of both FNAC and CBNAAT. Mycobacterial culture for drug susceptibility testing was not performed due to resource constraints, so we could not identify cases of multidrug-resistant TB among our cohort. Follow-up was primarily clinical and limited to the duration of ATT; longer-term surveillance for late recurrence was not performed. Despite these limitations, the study provides contemporary prevalence data from a large, unselected sample of neck swelling patients in a high-burden region, and highlights the continuing importance of histopathological examination in the diagnosis of tuberculous cervical lymphadenopathy.

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CONCLUSION

The study concluded that CTL constituted nearly one-fourth of patients presenting with neck swelling, with a clear female and young-adult predominance. Level V was the most commonly affected nodal site, while CBNAAT demonstrated high diagnostic yield, supporting its clinical utility in CTL diagnosis. Tuberculous cervical lymphadenopathy affects nearly one in four (24.6%) patients presenting with neck swelling in this region. Young adult females are most commonly affected, and the posterior triangle is the predominant site. FNAC with CBNAAT provides a rapid diagnosis in most cases, but histopathological examination of excised nodes remains indispensable when FNAC is inconclusive. The low rate of concomitant pulmonary TB (10.6%) underscores the need to suspect extrapulmonary TB even in the absence of respiratory symptoms. Early diagnosis and prompt anti-tubercular therapy leads to excellent outcomes.

RECOMMENDATIONS

1) FNAC can be the first-line investigation for cervical lymphadenopathy in TB-endemic countries.

2) When FNAC is non-diagnostic (reactive/necrotic) but clinical suspicion persists, excision biopsy for HPE is strongly recommended.

3) Chest X-ray alone is insufficient to rule out TB in cervical lymphadenopathy.

4) All confirmed cases should be registered under the National Tuberculosis Elimination Programme (NTEP) for standardised treatment.

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