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Cytomorphological Spectrum of Tuberculous Lymphadenitis: A Comparative Study Between Pediatric and Adult Populations

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ABSTRACT

Background: The most prevalent kind of extrapulmonary tuberculosis is tuberculous lymphadenitis (TBL), which differs from pediatric to adult patients in both cytomorphology and clinical manifestations. Although fine-needle aspiration cytology (FNAC) is essential for early diagnosis, there is currently a dearth of age-group comparison data.

Aim: To evaluate and compare the cytomorphological patterns tubercular lymph node lesions in the paediatric population with that of the adult population

Materials and methods: This was a comparative study, 50 pediatric and 150 adult patients diagnosed with tubercular lymphadenitis were enrolled and analysed in this study. Cytology smears were retrieved, reviewed and analysed. Cytological diagnosis of tubercular lymphadenopathy was determine and compared between pediatric and adult population.

Results: The lesions were most common (40% in 6-10 years in paediatric age and (40%) in 30-35 years in adult age group. Males were predominant in both paediatric (58%) and adult (56%) group. The cervical group of lymph nodes was the most frequently affected in both age groups. AFB positivity was more in pediatric TB lymphadenitis (75%) as compared to adult Tb lymphadenitis (54%). Reactive lymphadenitis was the commonest pattern followed by chronic lymphoproliferative lesions and mycobacterial lymphadenitis in both the groups. Cytomorphological pattern of tubercular lymphadenitis between pediatric and adult patients were differ significantly ($p<0.05$)

Conclusion: Cytological evaluation of lymph node lesions has a high diagnostic efficacy for the diagnosis of neoplastic lesions. The findings contribute to refining diagnostic approaches and improving the overall management of this extrapulmonary manifestation of tuberculosis.

Keywords: Tuberculous lymphadenitis, FNAC, cytomorphology, pediatric, adult, acid-fast bacilli.

1. INTRODUCTION

Tuberculosis (TB) continues to pose a serious threat to global public health, as a primary source of illness and mortality in underdeveloped nations. Around 15–20% of all TB cases are extrapulmonary, and the most common kind of extrapulmonary TB, tuberculous lymphadenitis (TBLN), contributes around 30–40% of cases, according to the WHO Global Tuberculosis Report 2023 [1]. Being one of the most populated countries, India accounts for over one-fifth of all TB cases reported globally, making it a major contributor to the disease's global incidence [2]. Out of the 10.4 million cases recorded worldwide in 2015, 2.8 million were reported in India alone [3]. Females and younger age groups are more likely to have TB lymphadenitis. On the other hand, classical pulmonary tuberculosis is more prevalent in older adults and men, with a peak onset age of 20–40 years [4,5]. For the confirmation of tubercular lymphadenitis, a variety of diagnostic techniques have been proposed, including culture, polymerase chain reaction, fine needle aspiration cytology (FNAC), and histological analysis of excised nodes. However, because of its 88-96% sensitivity and specificity, FNAC is a frequently used cytological method for diagnosing tubercular lymphadenitis. In comparison to polymerase chain reaction (expensive, requires training)

and culture studies (regarded as gold standards, but time consuming and skill required), FNAC is quick and affordable.[6] When acid fast bacilli (AFB) are detected using Ziehl-Nelsen (ZN) stain, auramine rhodamine stain, polymerase chain reaction, or bacilli culture from aspirates, it is the most accurate way to diagnose tuberculous lymphadenitis. However, because of the high prevalence of tuberculosis and the scarcity of resources, epithelioid cell granuloma is regarded as a sign of tuberculous lymphadenitis in our population [7]. The cytomorphological spectrum of TBLN may vary between pediatric and adult populations, according to a number of studies. Due to their underdeveloped immune systems, children are more likely to appear with suppurative and necrotic lesions, whereas adults frequently exhibit

well-formed granulomas with or without necrosis [8]. For pathologists and clinicians, knowing these distinctions is essential since it facilitates proper diagnosis, management, and the avoidance of needless intrusive procedures.

AIM: To examine and correlates the cytomorphological range of TB lymphadenitis between adult and pediatric patients.

2. MATERIAL AND METHODS

A prospective comparative study was conducted in the Department of Pathology, in a tertiary care center, India. Informed consent was taken from all adult participants and parents/guardians of pediatric cases.

Inclusion Criteria

FNAC-confirmed TBL with clinically suspected lymphadenopathy.

Age ≤16 years for pediatric group; >16 years for adult group.

Sufficient smears for cytological analysis

Patients who provided consent for the study

Exclusion Criteria

Cases where the aspirates are hemorrhagic or insufficient.

At the time of aspiration, patients were receiving anti-tubercular medication

Patients who not provided consent for the study

50 pediatrics and 150 adults patients diagnosed as tubercular lymphadenitis were enrolled and analysed in this study. All the patients presenting with peripheral lymphadenopathy were processed for cytopathological evaluation (FNAC).

With informed consent, FNAC was performed as per the standard operating procedure. Aspirates were deposited onto the slides. Subsequently alcohol fixed, air-dried and heat fixed smears were made. Alcohol fixed smears were stained routinely by Haematoxylin and Eosin (H&E) and Papanicolaou (PAP) method. Air-dried smears were stained by May Grunwald Giemsa (MGG) stain. Air-dried and heat fixed smears were stained by Ziehl-Neelson (ZN) stain for Acid-Fast Bacilli (AFB). Periodic Acid Schiff (PAS) staining was employed in selected cases for cytological evaluation. Various lesions were documented and categorized according to age, sex and site. Cytomorphological patterns of lymph node lesions were compared between paediatric and adult age group patients and analysed. Cytological diagnosis was compared with available histopathological diagnosis and concordance was calculated.

Statistical analysis: All statistical calculations were done through statistical software SSPS version 23. Frequencies, Chi-square test and crosstabs were used for calculation. Cytological diagnosis was compared with histopathological diagnosis and the diagnostic efficacy of FNAC was evaluated.

3. RESULT

A total of 200 cases were analysed, which included adults {150 cases (75%)} and paediatric age group {50 cases (25%)}. The lesions were most common (40% in 6-10 years in paediatric age and most common (40%) in 30-35 years in adult age group. Males were predominant in both paediatric (58%) and adult (56%) group. Majority of the patients belong to rural areas (64% cases in pediatric group and 68% in adult group).

Table 1: Socio Demographic profile of patients with Tuberculous Lymphadenitis

Variables		Pediatric Group (N=50)	Adult Group (N=150)
Age	≤ 1	6 (12%)	-
	1-5	9 (18%)	-
	6-10	20 (40%)	-
	More than 10	15 (30%)	-

	Less than 30	-	48 (32%)
	30-45	-	60 (40%)
	45-60	-	27 (18%)
	≥ 60	-	15 (10%)
Gender	Male	29 (58%)	84 (56%)
	Female	21 (42%)	66 (44%)
Residential Area	Rural	32 (64%)	102 (68%)
	Urban	18 (36%)	48 (32%)

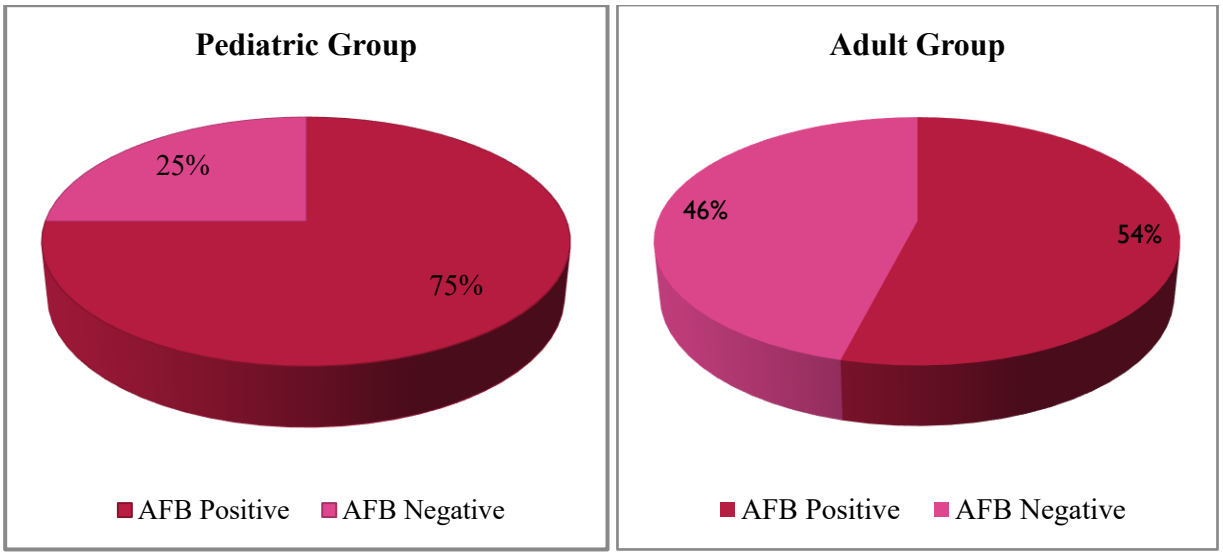
The cervical group of lymph nodes was the most frequently affected in both age groups, accounting for 60% of pediatric cases and 54.7% of adult cases followed by Axillary lymphadenopathy was observed in 12% of children and 16% of adults, while inguinal nodes were involved in 8% and 9.3% of cases respectively. Multiple group lymph node involvement was documented in 10% of pediatric patients and 9.3% of adult patients.

Table 2: Lymphnodes groups involved in Tuberculous Lymphadenitis

Lymph node involvement	Pediatric Group (N=50)	Adult Group (N=150)
Cervical	30 (60%)	82 (54.7%)
Axillary	6 (12%)	24 (16%)
Inguinal	4 (8%)	14 (9.3%)
Supraclavicular	3 (6%)	10 (6.7%)
Mesenteric	2 (4%)	6 (4%)
Multiple	5 (10%)	14 (9.3%)

AFB positivity was more in pediatric TB lymphadenitis (75%) as compared to adult Tb lymphadenitis (54%) [Graph: 1].

Graph 1: AFB Positivity in Tuberculous Lymphadenitis



Reactive lymphadenitis was the commonest pattern observed in both the paediatric age group and in adult population. Chronic lymphoproliferative lesions and tuberculous lymphadenitis constituted the least common lesions in the adults and the paediatric population respectively. Malignant lesions were further categorized into primary and metastatic lesions. Primary malignancies included Non-Hodgkins lymphoma and Hodgkin's lymphoma. Non-Hodgkins lymphoma was more common than Hodgkin's lymphoma. Among metastasis, most common pattern was poorly differentiated carcinoma, followed by squamous cell carcinoma and least was adenocarcinoma. All malignant cases were seen in only adult population [Table: 3].

Table 3: Distribution of lymph node lesions among paediatric and adult population

Category	**Pediatric Group (N=50)**	**Adult Group (N=150)**
Reactive lymphadenitis	32 (64%)	46 (30.7%)
Chronic granulomatous lymphadenitis	6 (12%)	31 (20.6%)
Malignancy	0	28 (18.7%)
Primary		6 (4%)
Non-Hodgkins lymphoma	-	5 (3.3%)
Hodgkins lymphoma	-	1 (0.7%)
Secondary	-	22 (14.7%)
Poorly differentiated carcinoma	-	15 (10%)
Squamous cell carcinoma	-	6 (4%)
Adenocarcinoma	-	1 (0.7%)
Mycobacterial lymphadenitis	2 (4%)	21 (14%)
Caseous necrosis	1 (2%)	7 (4.7%)
Epithelioid cell granuloma	1 (2%)	2 (1.3%)
Caseous necrosis with epitheloid cell granuloma	-	6 (4%)
No caseous necrosis No granuloma	-	6 (4%)
Acute suppurative lesions	5 (10%)	13 (8.7%)
Necrotising lymphadenitis	3 (6%)	6 (4%)
Chronic Lymphoproliferative Lesion	2 (4%)	5 (3.3%)

Malignant cases, tubercular lymphadenitis, chronic granulomatous lymphadenitis were more common in adults compared to the paediatric population. Statistically, the values were highly significant ($p<0.001$) [Table-4].

Table 4: Comparison of lymph node lesions between paediatric and adult population

Category	Pediatric Group (N=50)	Adult Group (N=150)	p-value*
Reactive lymphadenitis	32 (64%)	46 (30.7%)	p<0.001
Chronic granulomatous lymphadenitis	6 (12%)	31 (20.6%)	
Malignancy	0	28 (18.7%)	
Mycobacterial lymphadenitis	2 (4%)	21 (14%)	
Acute suppurative lesions	5 (10%)	13 (8.7%)	
Necrotising lymphadenitis	3 (6%)	6 (4%)	
Chronic Lymphoproliferative Lesion	2 (4%)	5 (3.3%)	

4. DISCUSSION

Tuberculosis is the single largest cause of mortality all over the world; the disease is more rampant in developing countries like India, which have the highest global disease burden. The brunt of the attack of tuberculosis is borne by the economically productive age group. Due to the immunosuppression, there is a higher frequency of extrapulmonary tuberculosis, of which lymphadenitis is the most common, usually with concomitant pulmonary tuberculosis. FNAC is an important diagnostic tool to aid in the diagnosis of lymph node lesions. It is rapid, inexpensive, safe and reduces the need for surgical biopsy [9-10].

Lymph node lesions can be found in patients with wide age range. In the present study, the common age of the paediatric population was 6-10 years and 30-35 years in adult age group, our findings are similar with the Singh N et al [11] and Shrivastav A et al [12].

In the current study, males were predominantly affected. Singh N, et al [13] and Sawaimul K et al [14], had documented similar observation in their study.

We have found that the cervical lymph nodes were the most common group of lymph nodes involved in both pediatric and adult patients, in agreement with the Ahmed HG et al [15] and Jyoti Heer, et al [16] had reported similar observation.

In our study AFB positivity was more in pediatric TB lymphadenitis as compared to adult Tb lymphadenitis, our result were comparable to other studies: S Choudhary, et al [17] and J Venkatraman, et al [18].

In the present study, non-neoplastic lesions were more common than neoplastic lesions. Reactive lymphadenitis was the most common cytological pattern of lymph node lesions followed by chronic granulomatous lymphadenitis in this research, concordance with the studies conducted by Ahmed HG, et al [15], Bhatta S et al [19] and Janagam C, et al [20] had observed that reactive lymphadenitis was the most common pattern followed by granulomatous lymphadenitis. In contrast to current study Shrivastav A et al [12] and Malhotra AS, et al [21] reported that the tuberculous lymphadenitis was the most common cytological pattern of lymph node lesions followed by reactive lymphadenitis in their studies. Tuberculosis still remains as one of the leading cause of cervical lymphadenopathy in India.

Malignant lesions are common in older age as elderly patients respond to infection with slight to moderate lymph node enlargement in contrast to children. Hence, elderly patients presenting with lymphadenopathy should be subjected to FNAC to rule out malignant lesion. FNAC may be the only tool in the diagnosis of metastatic lesions in the lymph nodes. It can help to detect occult primary malignancies. For the diagnosis of lymphomas, the FNAC may suggest an initial diagnosis, which can be subsequently followed by histopathology and immunohistochemistry for confirmation of the diagnosis [22].

Present study observed that the lymph node lesions were statistically significant differ between paediatric and adult population, in consistent with the M Dedeepya et al [23].

5. CONCLUSION

We have found that cytological patterns of lymph node lesions in paediatric and adult populations are significantly different.

The distribution pattern may reflect diverse aetiologies, characteristics of offending agent, immune status and susceptibility of the target population. Cytological evaluation of lymph node lesions has high diagnostic efficacy for the diagnosis of neoplastic lesions.

REFERENCES

[1] WHO Global Tuberculosis Report 2023. World Health Organization.

[2] Sachdeva KS, Mase SR. The end TB strategy for India. Indian Journal of Tuberculosis. 2019 Jan 1; 66(1):165 6.

[3] Dravid A, Natarajan K, Medisetty M, Gawali R, Mahajan U, Kulkarni M, Saraf C, Ghanekar C, Kore S, Rathod N, Dravid M. Incidence of tuberculosis among HIV infected individuals on long term antiretroviral therapy in private healthcare sector in Pune, Western India. BMC infectious diseases. 2019 Dec; 19:1-2.

[4] Shubha AB, Sapna H, Dinesh RB. Tuberculosis lymphadenitis presenting a diagnostic dilemma - A case report. Int J Dent Clin 2010; 2:48-52.

[5] Golden MP, Vikram HR. Extrapulmonary tuberculosis: An overview. Am Fam Physician 2005; 72:1761-8.

[6] Corbett EL, Watt CJ, Walker N, Maher D, Williams BG, Raviglione MC, et al. The growing burden of tuberculosis: Global trends and interactions with the HIV epidemic. Arch Intern Med 2003; 163:1009-21.

[7] Mohapatra PR, Janmeja AK; Tuberculous lymphadenitis. J Assoc Physicians India, 2009; 57:585-90.

[8] Singh N, Nijhawan R, Srinivasan R, et al. Cytomorphologic patterns of tuberculous lymphadenitis and their correlation with HIV status. Acta Cytol. 2010; 54(1):30–36.

[9] A. Hemalatha, P. Shruti, M. U. Kumar, and A. Bhaskaran, "Cytomorphological Patterns of Tubercular Lymphadenitis Revisited," Annals of Medical and Health Sciences Research 4 (2014): 393–396

[10] K. Khan, "Impact of Fine Needle Aspiration Cytology Strategy Implemented at the Microscopy Center Level for Diagnosis of Tuberculous Lymphadenitis," Indian Journal of Tuberculosis 71 (2024): 269–275.

[11] Singh N, Singh A, Chauhan R, Singh P, Verma N. Fine needle aspiration cytology in evaluation of lymphadenopathy in pediatric age group: Our experience at tertiary care centre. IJCMR. 2016; 3(5):1347-51.

[12] Shrivastav A, Shah HA, Agarwal NM, Santwani PM, Srivastava G. Evaluation of peripheral lymphadenopathy by fine needle aspiration cytology: A three year study at tertiary center. J NTR Univ Health Sci. 2014;3(2):86-91

[13] Singh N, Gupta P. Bacillus Calmette-Guerin lymphadenitis in children: an underdiagnosed entity. Int J Community Med Public Health 2024; 11:870-3.

[14] Sawaimul K, Iqbal MB, Sawaimul V, Kambale T. Fine needle aspiration cytology: A diagnostic tool in evaluation of lymphadenopathy in paediatric age. IJPO. 2018;5(2):184-88

[15] Ahmed HG, Elmubasher MB, Salih RAA, Elhussein GEMO, Ashankyty IMA. Fine needle aspiration cytopathology of pediatric lymphadenopathy among Sudanese children. Asian Pac J Cancer Prev. 2013; 14(7):4359-63.

[16] Dr. Jyoti Heer, Dr. Arundhati Vaid, Dr. Ayushi Sharma, Cytomorphological Pattern of Tuberculous Lymphadenitis and Correlation with AFB Positivity, International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 12, No. 4, Oct-Dec 2023 Online ISSN: 2250-3137 Print ISSN: 2977-0122

[17] Shaista Choudhary DR Krishna Kishore, Study of Cytomorphological Spectrum of Tuberculous Lymphadenitis And Correlation With AFB Positivity, Indian journal of applied research, Volume : 6 | Issue : 4 | April 2016 | ISSN - 2249-555X

[18] Janarthanam Venkatraman*, K. Bhavani, Cytomorphological Patterns of Tuberculous Lymphadenitis in Correlation with AFB Positivity, Indian Journal of Pathology: Research and Practice / Volume 6 Number 2 / April - June 2017

[19] Bhatta S, Singh S, Sangita RC. Diagnostic value of fine needle aspiration cytology in the assessment of cervical lymphadenopathy. Med Phoenix. 2018; 3(1):36-40.

[20] Janagam C, Atla B. Role of FNAC in the diagnosis of cervical lymphadenopathy. Int J Res Med Sci. 2017;5(12):5237-41

[21] Malhotra AS, Lahori M, Nigam A, Khajuria A. Profile of lymphadenopathy: An institutional based cytomorphological study. Int J Appl Basic Med Res. 2017; 7(2):100-03.

[22] Wilkinson AR, Mahore SD, Maimoon SA. FNAC in the diagnosis of lymph node malignancies: A simple and sensitive tool. Indian J Med Paediatr Oncol. 2012; 33(1):21-24.

[23] M Dedeepya, As Ramaswamy, BN Kumarguru, M Udaya Kumar, A Comparative Study of Cytomorphological Patterns of Lymph Node Aspirates in Paediatric and Adult Populations, Journal of Clinical and Diagnostic Research. 2020 Oct, Vol-14(10): EC01-EC06.