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Original Research Article

A Study of Cytomorphological Spectrum of 300 Cases of Superficial Lymphadenopathy in a Tertiary Care Center in Garhwal Region of Uttarakhand

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ABSTRACT

Background
India continues to be a country with a high burden of tuberculosis. Tuberculous lymphadenitis is one of the commonest manifestations of extra pulmonary tuberculosis. The aim of this study was to find the commonest cause of superficial lymphadenopathy and to describe the various cytological patterns of tuberculous lymphadenitis.

Materials and Methods
This was a cross sectional study conducted between June 2022 and September 2023. All patients with superficial lymphadenopathy were included in the study. All slides were stained with H & E, PAP and MGG. Acid fast staining for tubercular bacilli was done on smears with cytological features of tuberculosis and in all cases where pus was aspirated.

Results
A total of 300 aspirations were done. Maximum aspirates were blood mixed material (81.6%). 144 cases were of tubercular lymphadenitis with cervical group of lymph nodes (75.6%) being the commonest location. Maximum cases of tubercular lymphadenitis were in the age group of 21-30 years (36) and showed a female preponderance (75). Out of the 144 cases 43.75% showed AFB positivity on ZN stain. Epithelioid cell granuloma with necrosis was the commonest cytological pattern seen (41.7%) and showed maximum AFB positivity. Minimum AFB positivity was seen with smears showing caseous necrosis only.

Conclusions
Superficial lymphadenopathy is one of the commonest indications for FNAC and tuberculosis is the commonest etiology in our region. Coupled with ZN staining a reliable and early diagnosis of tuberculous lymphadenitis can be given avoiding a biopsy. In patients where AFB is not demonstrated on ZN staining, a microbiological confirmation could be sought for diagnosis.

Keywords: Lymphadenopathy, Tuberculosis, Cytological pattern, AFB

INTRODUCTION

Tuberculosis is an ancient disease. Though Johann Sconlein coined the term “tuberculosis” in 1834, it has been estimated to have been around for as long as 3 million years. Tuberculosis was called “phthisis” in ancient Greece, “tabes” in Rome and “schachepheth” in ancient Hebrew. It was commonly called “consumption” in 1800s even after Schonlein named it tuberculosis.[1]

Tuberculosis continues to be a major health challenge in our country. India still carries the highest burden of tuberculosis in the world and accounts for 31% of global TB deaths in HIV negative and HIV positive people according to Global tuberculosis report 2020.[2] Lymphadenitis is one of the most common manifestations of extrapulmonary tuberculosis.[3] It

is important to distinguish tuberculosis from other causes of lymphadenitis because the management is different and can make a significant difference in the patient outcome. A timely appropriate management of tuberculosis can result in complete recovery from the disease. Fine needle aspiration cytology is a convenient, inexpensive, rapid method of investigating superficial lymphadenopathy. In a resource limited country like ours where TB culture and PCR are not available in every center, a simple Ziehl- Neelsen staining for acid fast bacilli on the aspirated material is the simplest and a reliable method for demonstrating tubercular bacilli. The aim of our study was to confirm the diagnosis of tuberculosis as the cause of superficial lymphadenopathy by cytomorphological features and Ziehl- Neelsen staining and to describe the various cytological patterns and their relative frequency.

MATERIALS AND METHODS

This study was conducted in the Department of Pathology at Veer Chandra Singh Garhwali Institute of Medical Science and Research. FNAC was done in all cases of superficial lymphadenopathy between June 2022 and September2023 using 10 ml syringe and 22-gauge needle under aseptic precautions. The data collected included the patient's age, gender, location of the lymph nodes, gross examination of the material aspirated and cytopathological features on examination of the aspirate. Hematoxylin and eosin (H & E), Papanicolaou stain (PAP) and May Grunwald Giemsa (MGG) were done on all slides prepared from the aspirate. Acid fast staining for tubercular bacilli was done on smears where cytomorphological features of tuberculosis were observed and, in all cases where pus was aspirated.

RESULTS

During the study period a total of 300 aspirations for superficial lymphadenopathy were done. Out of these, 144 were tubercular lymphadenitis, 124 were reactive lymphadenitis, 17 showed metastatic lesion, 10 were of suppurative pathology, 4 were Lymphomas and one case of Rosai Dorfman disease (Table-1).

Table-1: Cytomorphological spectrum of cases of superficial lymphadenopathy (n=300)

Type of lesion	Number (%)
Tubercular lymphadenitis	144 (48 %)
Reactive lymphadenitis	124 (41.3 %)
Metastasis of malignancy	17 (5.7 %)
Suppurative pathology	10 (3.3 %)
Lymphomas	4 (1.3 %)
Rosai Dorfman disease	1 (0.3 %)

The commonest location of the lymphadenopathies was the cervical group of lymph nodes (Table-2) accounting for 75.6% of the total cases.

Table-2: Anatomical distribution of lymphadenopathy with site

Anatomical location	Number of cases (%)
Cervical	227 (75.6 %)
Axillary	20 (6.7 %)
Submandibular	19 (6.3 %)
Submental	14 (4.7 %)
Supraclavicular	11 (3.7 %)
Inguinal	7 (2.3 %)
Occipital	2 (0.6 %)
Total	**300**

Out of the 300 aspirations done, 144 were diagnosed as tubercular lymphadenitis. In our study maximum number of patients (25%) were in the age group of 21 to 30 years followed by 20% in the 11 to 20 years group (Table-3). The youngest patient of tubercular lymphadenitis was 9 months old male and the eldest was a 65-year-old female.

Table-3: Age distribution of tubercular lymphadenitis

Age group (years)	Number	Percentage (%)
0-10	9	6.3 %
11-20	29	20.2 %
21-30	36	25 %
31-40	30	20.8 %
41-50	15	10.4 %
51-60	23	15.9 %
61-70	2	1.4 %

A female preponderance was seen in the patients of tubercular lymphadenitis (Figure-1)

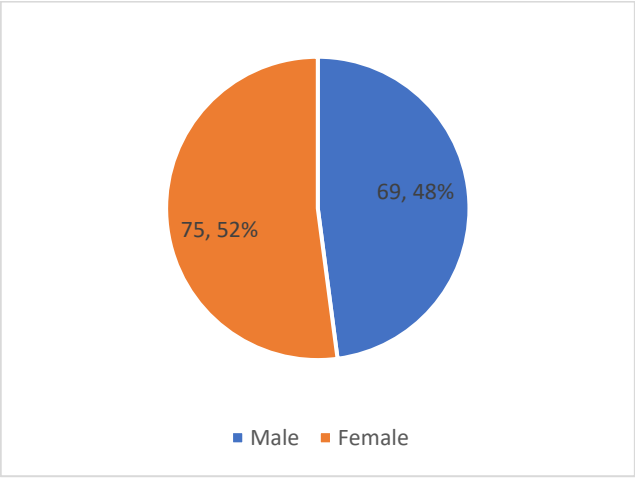

Figure-1: Sex distribution of tubercular lymphadenitis

As with other causes of lymphadenitis, cervical lymph nodes were the commonest group of lymph nodes involved accounting for 72.9% of the total number (Table-4).

Table-4: Anatomical distribution of tubercular lymphadenitis

Anatomical Location	Number (%)
Cervical	105 (72.9 %)
Submental	15 (10.4 %)
Submandibular	8 (5.6 %)
Axillary	8 (5.6 %)
Supraclavicular	7 (4.9 %)
Inguinal	1 (0.6 %)
Total	**144**

Right cervical group accounted for 51 cases, left cervical group were 50 and 4 cases showed bilateral cervical tubercular lymphadenopathy. Maximum aspirates were blood mixed accounting for 245 of the total aspirates. Maximum cases of tubercular pathology were also seen also seen in the same (Table-5).

Table-5: Cytomorphological spectrum with respect to material aspirated

Material aspirated	RL	TL	MM	S	L	RD	Total
Pus	-	5	5	10	-	-	20
Whitish material		30	4	-	1	-	35
Blood mixed material	124	109	8	-	3	1	245

(RL=Reactive Lymphadenitis, TL= Tubercular Lymphadenitis, MM= Metastatic Malignancy, S=Suppurative pathology, L= Lymphomas, RD= Rosai Dorfman disease).

Out of the total 144 cases of tubercular lymphadenitis, 63 (43.75%) showed AFB on Ziehl-Neelsen staining (Figure-2).

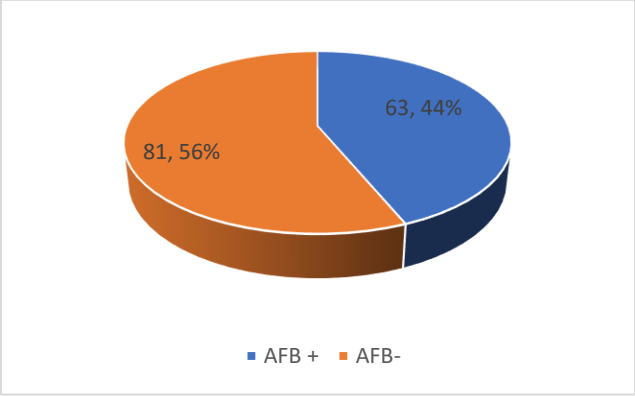

Figure-2: Distribution of cases tubercular lymphadenitis according to AFB positivity

In our study four cytomorphological patterns were seen (Figure-3) in tubercular lymphadenitis out of which epithelioid cell granulomas with necrosis accounted for maximum cases and showed maximum AFB positivity (41.7%) as well. Minimum AFB positivity was seen with caseous necrosis only (Pattern 3) (Table-6).

Table-6: Distribution of cases according to cytology and AFB positivity

Cytology	AFB +	AFB -	Total
Epithelioid giant cell granuloma with necrosis (Pattern 1)	38 (63.3%)	22	60 (41.7%)
Epithelioid giant cell granuloma without necrosis (Pattern 2)	10 (30.3%)	23	33 (22.9%)
Caseous necrosis only (Pattern 3)	4 (13.3%)	26	30 (20.8%)
Caseous necrosis with inflammatory cells (Pattern 4)	11 (52.3%)	10	21 (14.7%)
Total number of cases	**63**	**81**	**144**

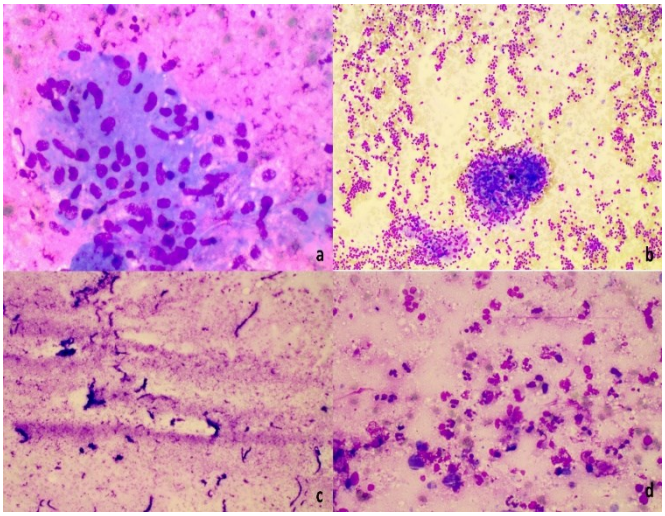

Figure 3: Four Cytomorphological Patterns showing granuloma with necrosis (a), granuloma without necrosis (b), necrosis only (c) and necrosis with inflammatory cells (d)

DISCUSSION

Mycobacterium tuberculosis is a highly aerobic bacilli and requires high levels of oxygen therefore it primarily infects the lungs. Tubercular lymphadenitis is the commonest extrapulmonary manifestation of tuberculosis.[3] There are many diagnostic methods for tubercular lymphadenitis such as FNAC, PCR, culture and histopathological examination of the excised lymph node. FNAC is the usually preferred in many centers as it is rapid, inexpensive and can be done as an outpatient procedure with very little preparation. The pathogenesis of Tubercular lymphadenitis is complex. It could be due to reactivation of a healed focus which was

involved in primary infection or it could spread from the tonsil or it could result from hematogenous spread.[4]

In our study, a female preponderance was seen for tubercular lymphadenitis which was also observed by Paliwal et al,[5] Khajuria et al,[6] Narang et al,[7] Rana et al[8] and Choudhary et al[9] in their studies. Female preponderance for overall anterior neck swellings was also observed by Joshi H et al.[10] Females generally suffer from poor nutrition in our society. Coupled with unhygienic living conditions they become more susceptible to tuberculosis infection.[11]

Maximum number of patients were between 31 to 40 years of age. Similar age group was also seen by Paliwal N et al,[5] Soumya et al,[12] and Shretha et al.[13] Cervical lymph nodes were the commonest group of lymph nodes affected in our study accounting for 72.9% of the cases. Similar results have been reported by Khajuria et al,[6] and Patel et al.[14] The lymphatic drainage of the lung is to the supraclavicular lymph nodes of the same side; therefore, the right lung drains to the right supraclavicular and the left lung drains to the left supraclavicular lymph nodes. The exception being the lower lobe of the left lung which drains to the right supraclavicular lymph nodes. From the supraclavicular lymph nodes, they further drain to the cervical chain.[15] That could explain why cervical lymph nodes, particularly the right cervical, are the commonest group involved in tubercular lymphadenitis.

In our study maximum AFB positivity was seen in pattern 1 which showed epithelioid giant cell granuloma with necrosis and minimum positivity was with necrosis only. As with M. leprae where the Ridley Jopling classification correlates the morphology with the bacillary Index (BI) which in turn reflects the immunological status of the patient, similarly in M. tuberculosis the morphology of the lesion portrays the tissue reaction and immunity of the patient which in turn determines the AFB positivity of the lesion. M. tuberculosis evokes two types of responses, one is a macrophage activating response and the other is a delayed hypersensitivity reaction. The purpose of both is to limit the growth and dissemination of the bacilli. Morphological epithelioid giant cell granulomas are seen which are the hallmark of the disease. The center of the granuloma is filled with caseous necrosis which undergoes liquefaction as the disease progresses and turns into purulent material and is usually aspirated on FNAC. This purulent material has an anerobic acidic environment which does not favor the growth of the tubercle bacilli. Extrapolating this to AFB positivity, purely granulomatous lesion with no necrosis would indicate a good immunity and therefore no AFB. At the other extreme only necrotic material will also show no AFB. It is between these two extreme ends of the spectrum; variable number of AFB may be observed in the intermediate stages of the disease depending on the degree of tissue destruction.[16] Epithelioid cell granuloma with necrosis (pattern 1) was the commonest pattern seen in our study. Similar results were also observed by other studies also (Table-7).

Table-7: Comparison of the cytomorphological patterns with other studies

Studies (year)	Pattern 1	Pattern 2	Pattern 3	Pattern 4
Vashisht et al (2018)[17]	63.6 %	22.4 %	9 %	5%
Bhatta et al (2018)[18]	53.17 %	38 %	8.73 %	-
Patel et al (2018)[14]	23.1 %	16.7 %	39.7 %	20.1 %
Chaurasia and Sharma (2019)[19]	60 %	28.54 %	11.46 %	-
Naz and Sharma (2019)[20]	58.1 %	23.1 %	23.1 %	-
Jamsheed et al (2020)[21]	33.7 %	31.1 %	3.6 %	30.6 %
Pradhan et al (2020)[22]	45.32 %	18.22 %	15.27 %	21.18 %
Soumya et al (2020)[12]	49 %	22 %	29 %	-
Dharmalingam et al (2022)[23]	53.52 %	36.62 %	5.63 %	4.22 %
Shetty and Vyas (2022)[24]	59 %	22 %	14 %	5 %
Our Study (2023)	41.7 %	22.9 %	20.8 %	14.6 %

CONCLUSIONS

Superficial lymphadenopathy is one of the commonest indications for FNAC and tuberculosis is the commonest etiology in our region. Coupled with ZN staining a reliable and early diagnosis of tuberculous lymphadenitis can be given avoiding a biopsy. In patients where AFB is not demonstrated on ZN staining, a microbiological confirmation could be sought for diagnosis.

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