IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Retrospective Analysis Of Cytomorphological Pattern Of Lymph Nodes In Pediatric Age Group Using FNAC

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Abstract: **Introduction:** Lymphadenopathy especially cervical lymphadenopathy is commonly presented complaint in pediatric age group. In majority of pediatric cases, enlarged lymph nodes are due to reactive causes and are self-limiting. Hence excision biopsy is not required in all cases. FNAC is safe, accurate, minimally invasive procedure where resources are limited, and access to surgical biopsy is limited. **Material and methods**: This retrospective study was carried out with the data collected for period of 2 years from January 2022 to December 2023, from department of pathology, GMERS medical College and hospital, Sola, Ahmedabad. All pediatric cases (≤18 years) with superficial lymphadenopathy where FNAC was performed during the study period was included. Aspirated material was stained with H&E, PaP stain, Giemsa stain and Z&N stain (whenever required). Lymphadenopathy was classified, based on cytomorphological findings into Benign (Nonspecific reactive, Acute suppurative, Granulomatous) and Neoplastic. **Results:** Total 126 lymph nodes were aspirated during study period in pediatric age group. The results were categorized into 2 broad categories: Benign and Malignant. Among Benign lesion- 49 cases (38.89%) were of Nonspecific reactive lymphadenitis, 53 cases (42.06%) were of Granulomatous and 22 cases (17.46%) were of acute suppurative lymphadenitis. Among malignant - 2 cases were identified, 1 of Hodgkin Lymphoma (0.8%) and 1 of Non-Hodgkin Lymphoma (0.8%). In this study maximum number of the patients were in the age group of 11-18 years (61.90%) followed by 6-10 years (23%), in ≤5years (15.08%). Male to Female ratio is 1: 0.96. **Conclusion:** FNAC is safe, rapid and accurate method of investigation in pediatric superficial lymphadenopathy and help in next appropriate steps of management. Nonspecific reactive and Granulomatous (tuberculous) lymphadenopathy are most common cytomorphological findings seen in pediatric superficial lymphadenopathy examination.

Keywords: cervical lymphadenopathy, FNAC, pediatric age group.

I. Introduction:

Lymphadenopathy especially cervical lymphadenopathy is common problem seen in pediatric age group. [1,2]
Reticuloendothelial system which includes lymphatics and its termination into lymph nodes.
Presence of abundant phagocytic cells, lymphocytes and antigen presenting cells provide ideal first line of defense against pathogens. As a result, most of the children have small palpable cervical, axillary and inguinal lymph nodes.[3]
They are not considered enlarged until their diameter exceeds 1 cm for cervical and axillary nodes, more than 1.5cm for inguinal lymph nodes.
Lymphadenopathy that is present for longer than a week might be pathological so required thorough evaluation.[3]

The etiology includes a wide variety of differential diagnosis varies from benign reactive process to infections and malignancies.[4,5]
In majority of pediatric cases, the enlarged lymph nodes are due to reactive causes and are self-limiting.[6] Hence, it is not possible or required to perform excision biopsy in all these cases.
FNAC is safe, accurate, rapid, minimally invasive procedure with good patient acceptance and low morbidity.[7,8]
It is relatively cheap, leave no scars, relatively free of complications, repeatable and can be easily done on outpatient basis.
FNAC has been used in resources limited facilities, where access to surgical biopsy is limited.[8]
Culture and histopathology should be considered in case where FNAC is non-diagnostic or required more specific diagnosis.[9]

II. Material and methods:

This retrospective study was carried out with the data collected for period of 2 years from January 2022 to December 2023, from department of pathology, GMERS medical College and hospital, Sola, Ahmedabad, Gujarat, India. It is a tertiary care hospital.
All pediatric cases (less than 18 years) with superficial lymphadenopathy where FNAC was performed during the study period was included.
Data has been collected in the form of presented Clinical history, other investigations findings, clinical examination findings, microscopic findings and diagnosis given at the time of investigation.
FNAC was done on a representative lymph node according to standard protocol and following strict aseptic precautions.
An informed consent was taken from parents/ guardian before performing the procedure.

All the cases fulfilling following criteria were included in the study:
● Age less than 18 years
● Lymph nodes enlargement with diameter exceeding 1 cm for cervical and axillary nodes, 1.5 cm for inguinal nodes.

Following exclusion criteria were applied:
● age more than 18 years

FNAC procedure was done with 22-24 gauze needle.
The aspiration and non- aspiration technique with minimum 3-4 passes used to minimize hemorrhage.
The sample was placed on a glass slide and smears were made by inverting second glass slide over the drop and a sit spreads, pulling the slides apart horizontally or vertically.
Smears were fixed with ethyl alcohol (methanol) or kept air dried soon after.
The fixed smear was subjected to Hematoxylin & Eosin or Papanicolaou (PAP) stain while, the air-dried smears were subjected to Giemsa stain, followed by microscopic examination.

Staining procedure:

1)Giemsa Staining:
● Allow the smear to air dried, keep 15 minutes in methanol and then again allow it to air dry perfectly
● Take 10 ml of working buffer (2.5 ml stock buffer and 7.5 ml of Distilled water) & add 10 drops of Giemsa working solution in a test tube. Mix it properly.
● Pour & cover the slide with the above mixed solution on smear for 30 minutes. Don’t let it dry.
● Wash in distilled water
● Dry the smear
● Mount the smear with DPX.

2)Papanicolaou method: (Rapid pap smear)
● Smears are fixed with methanol, then let it dry.
● Keep the slide on staining rack and add few drops of nuclear stain of rapid PAP and wait for 60 seconds, then wash in tap water.

● Add 2-5 drops of wash buffer and wash it after 20 seconds.,
● Dehydrate with dehydrant for 60 seconds.
● Keep the slide on staining rack and add few drops of working cytoplasmic stain of rapid PAP and wait for 2 minutes, then wash in tap water.
● Again, Dehydrate with dehydrant for 60 seconds.
● Rinse with xylene.
● Mount the smears with DPX.

3)Hematoxylin & Eosin (H & E) method:
● 95% alcohol was used on wet smears for 10 min.
● Stained with hematoxylin solution for 1 minute.
● Rinsed in water.
● Dip in Eosin for 2-3 dips.
● Rinsed in water.
● Again, dip in 2 changes of isopropyl alcohol.
● The stained slides were then cleared in xylene, mounted in DPX mountant and examined under the microscopy

Cytomorphological patterns: Based on cytomorphological, superficial lymphadenopathy was classified into one of the following categories – non-neoplastic and neoplastic. Smears were not considered in which lymphoglandular bodies were absent or cytologic material was insufficient for diagnosis.

III. Results:

Total 126 lymph nodes were aspirated during study period in pediatric age group.
On the basis of cytomorphological findings the results were categorized into 2 broad categories: Benign and Malignant.
Among Benign lesion- 49 cases(38.89%) were of Nonspecific reactive lymphadenitis, 53 cases(42.06%) were of Granulomatous and 22 cases(17.46%) were of acute suppurative lymphadenitis.
Among malignant - 2 cases were identified, 1 of Hodgkin Lymphoma(0.8%) and 1 of Non Hodgkin Lymphoma (0.8%).

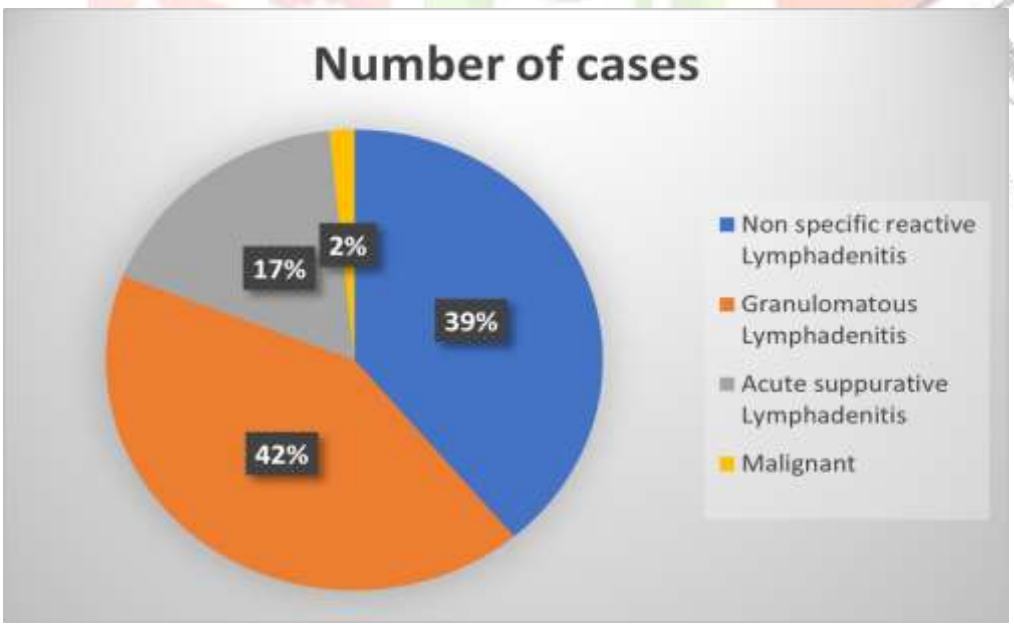


figure 1. distribution of cytomorphological findings

table 1 total number of cases in various cytological findings

Cytomorphological findings	Total No. of cases	Percentage
Nonspecific reactive lymphadenitis:	49	38.89%
Granulomatous lymphadenitis: Non-necrotising Necrotising Tuberculous Total	 14 12 27 53	 42.06%
Acute suppurative lymphadenitis:	22	17.46%
Malignant: Hodgkin Lymphoma Non-Hodgkin Lymphoma	 1 1	 0.8% 0.8%

Age and Gender Distribution:

The study group was divided into 3 age groups- ≤ 5 years, 6-10 years, 11-18 years. In this study maximum number of the patients were in the age group of 11-18 years (61.90%- 78 cases among 126 cases) followed by 6-10 years (23%- 29 cases/126 cases), in ≤5 years (15.08%-19 cases/126 cases).

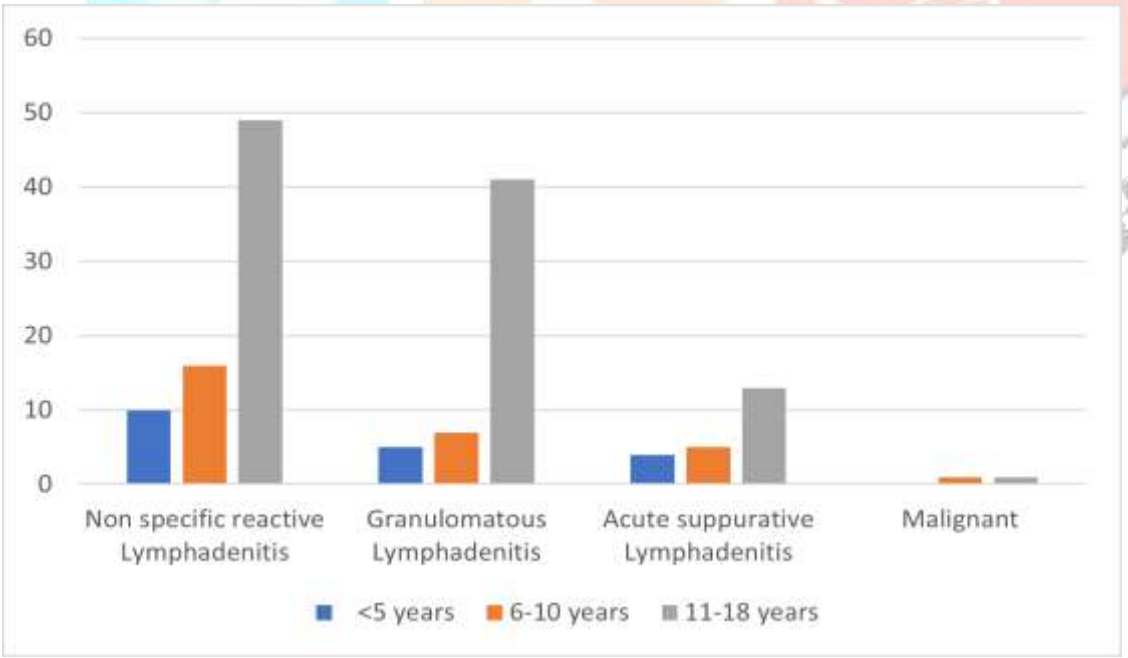


figure 2. age wise distribution of cytomorphological findings.

Table 2. age wise distribution of cytomorphological findings.

Cytomorphological findings	≤5 years	6-10 years	11-18 years	Total
Non specific reactive lymphadenitis :	10	16	23	49
Granulomatous lymphadenitis : Non Necrotising - Necrotising - Tuberculous - Total-	 0 0 5	 2 3 2	 12 09 20	 14 12 27 53
Acute suppurative lymphadenitis	4	5	13	22
Malignant: Hodgkin Lymphoma- Non Hodgkin Lymphoma-	 0 0	 0 1	 1 0	 1 1
Total	19(15.08%)	29(23.01%)	78(61.90%)	126

table 3. gender wise distribution of cytomorphological findings

Cytomorphological findings	Male	Female	Total
Non specific reactive lymphadenitis:	30	19	49
Granulomatous lymphadenitis : Non Necrotising - Necrotising - Tuberculous - Total-	 06 06 08	 08 06 19	 14 12 27 53
Acute suppurative lymphadenitis:	12	10	22
Malignant: Hodgkin Lymphoma - Non Hodgkin Lymphoma -	 1 1		 1 1
Total	64(50.8%)	62(49.2%)	126

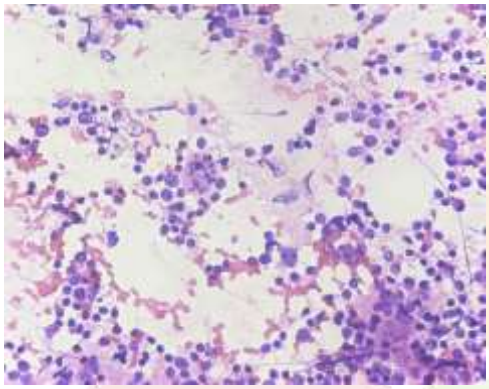
Male to Female ratio is 1: 0.96. Out of total 126 cases, 64 aspirate from Male (50.8%) and 62 was from Female (49.2%)

IV. Conclusion:

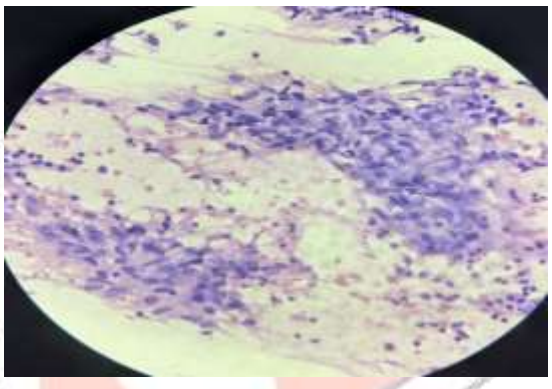
FNAC is safe, rapid and accurate method of investigation in pediatric superficial lymphadenopathy and help in next appropriate steps of management. Non specific reactive and Granulomatous (tuberculous) lymphadenopathy are most common cytomorphological findings seen in pediatric superficial lymphadenopathy examination.

V. Discussion:

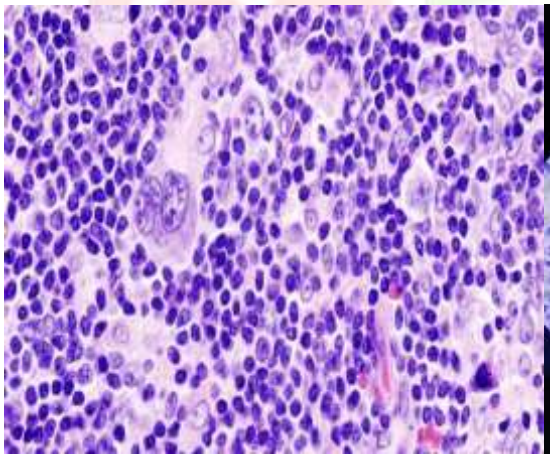
Superficial lymphadenopathy (cervical) is common clinical presentation seen in pediatric population.
The etiology may vary from benign to malignant condition. FNAC play important role in diagnosis of different cytomorphological pattern in different etiology.
FNAC is easy, relatively non invasive, rapid, cost effective procedure in resources limited facilities.
In this study, total 126 cases of lymphadenopathy were aspirated during the study period. Majority of cases were benign (124/126- 98.6%) and only 1.6% cases with malignancies were identified in the study group. All cases identified as malignant on FNAC, must be confirmed by histological examination.
Among Benign cases, 38.89% (49/126) cases were of Nonspecific reactive - Their characteristic cytomorphological features consisted of polymorph lymphocytes with many tingled body macrophages, 42% (53/126) cases were of Granulomatous lymphadenitis - characteristic cytomorphological features consisted of granuloma, giant cells with or without necrosis. Out of 53 Granulomatous lymphadenitis, 12 were identified as necrotic and 41 (27 tubercular lymphadenitis included) were identified as non-necrotic.
In our countries where tuberculosis is endemic, all Granulomatous lymphadenitis cases must be worked up for AFB (acid fast bacilli) by Ziehl Neelson Stain until proved otherwise.
Among Granulomatous lymphadenitis AFB positive seen in 27 cases- characteristics cytological features consisted of presence of Langhan giant cells & caseous necrosis are hallmark of tuberculous lymphadenitis.



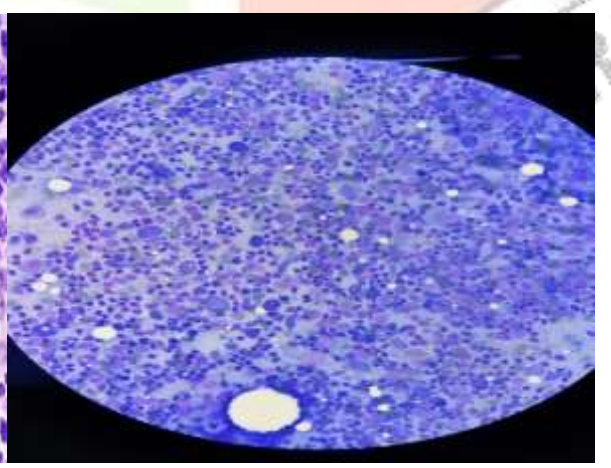
Nonspecific reactive lymphadenitis findings



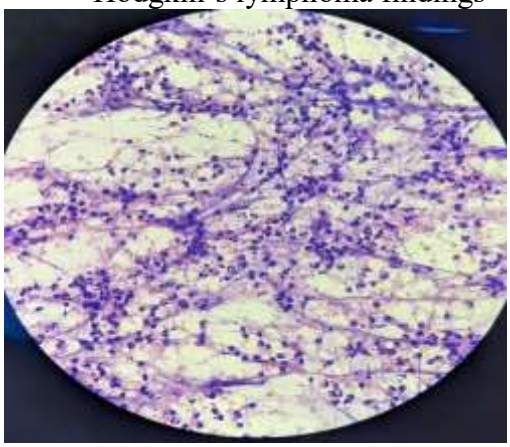
Granulomatous lymphadenitis findings



Hodgkin’s lymphoma findings



Non-Hodgkin’s lymphoma findings



Acute suppurative lymphadenitis

Comparison of cytodiagnosis of current study with other studies.

Cytodiagnosis	Neha Singh[2]		Silas OA[3]		Dr Pinal Patel[6]		Own study	
	Cases	%	Cases	%	Cases	%	Cases	%
Benign								
Non specific reactive	324	71.05%	31	72.1%	67	59%	49	39.51%
Tuberculous	78	17.11%	08	9.3%	-	-	27	21.77%
Granulomatous	38	8.33%	-	-	47	41%	26	20.97%
Acute suppurative	16	3.51%	04	18.6%	-	-	22	17.74%
Total	456	100%	43	100%	114	100%	124	100%
Malignant								
Hodgkin Lymphoma-	05	62.5%	02	15.04%	01	12%	01	50%
Non Hodgkin Lymphoma-	02	25%	10	76.9%	03	38%	01	50%
Metastasis	01	12.5%	01	7.7%	04	50%	-	-
Total	08	100%	13	100%	08	100%	02	100%

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