

# Study of lymphnode lesions by fine needle aspiration cytology and histopathology: A study of 125 cases

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## Abstract

**Background:** Fine needle aspiration cytology (FNAC) is a simple and rapid diagnostic technique and because of early availability of results, simplicity, minimal trauma and complication, the aspiration cytology is now considered as a valuable diagnostic aid and is gaining popularity. It also helps in giving proper direction for appropriate investigations. **Objectives:** To find out number of cases where FNAC of the lymph nodes picked up an unsuspected malignancy and to correlate the cytological findings with the histopathological findings in cases where lymph node biopsy is done. **Methodology:** It was a prospective study done on patient who presented with lymphadenopathy to various departments and referred to pathology department. The aspirate was collected from the enlarged lymphnodes using standard procedure with proper aseptic condition. The aspirate was examined for the amount and nature of the aspirated material, and then several smears were prepared. Smears were immediately fixed in 95% ethyl alcohol, and these smears were examined using various stains like haematoxylin and eosin stain, PAS stain also MGG's stain and Ziehl Neelsen stain. **Observations:** out of total 125 patients, 91 (73.60%) were Male patients and 34 (26.40%) were Female patients with M:F ratio of 2.79:1 with Male predominance. Distributions of all lymph node lesions shows cervical site i.e. 97 (77.6%) followed by inguinal i.e. 14 (11.2%) and other sites. Among all lymphnode lesions, 66.40% were neoplastic lesions and 33.60% were non- neoplastic lesions. Neoplastic lesions were more common in cervical group and Metastatic squamous cell carcinoma was more common in cervical group. Cytological diagnosis was correlated with histopathology diagnosis in 13.6% cases. **Conclusion:** FNAC can help not only to differentiate among lymphoma, and metastasis, but also to identify nonspecific reactive lymphadenitis and specific infections such as tuberculosis lymphadenitis. The results are quite encouraging and even more advanced diagnostic tools available, FNAC can still recommended as the initial diagnostic test in the evaluation of superficial lymphadenopathy.

**Keywords:** FNAC, Superficial lymphadenopathy, Histopathological diagnosis.

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## Introduction

The lymph node is one of the major anatomic components of the immune system. Lymph nodes are the most widely distributed and easily accessible component of lymphoid tissue and hence they are frequently examined for diagnosis of lymphoreticular disorders [1,2]. They are the site of clonal expansion and differentiation of lymphocytes necessary for an effective adaptive immune response [1,2].

A normal lymph node is rarely palpable. Cytological characteristics of cells from a normal lymph node are essentially based on the morphology of individual cells as observed in the aspirate from a reactive lymph node.

The lymphocytes constitute 87% to 99%, Plasma cells 0% to 5% and remainder cells 1% to 3% (histiocytes, mast cells, eosinophils and neutrophils) [3]. Diagnosis of lymphadenopathy depends mainly on excision of a gland and histopathological examination. For this, general anaesthesia and hospitalization are required.

Fine needle aspiration cytology, on the other hand, is free from these disadvantages and can safely be used as an alternative or complementary investigative technique [1]. Fine needle aspiration cytology (FNAC) is a simple and rapid diagnostic technique. Because of early availability of results, simplicity, minimal trauma and complication, the aspiration cytology is now considered as a valuable diagnostic aid and is gaining popularity

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[4]. The cytomorphological features obtained in needle aspiration, frequently correlate very well with histologic appearance of the same lesion and in some situations has qualities of a micro-biopsy. The FNAC, along with making a diagnosis, it also helps in giving proper direction for appropriate investigations. Aspirates from lymph nodes are usually very cellular and their interpretation varies from clear diagnosis to a firm request for histopathology.

The objective of the study was to find out number of cases where FNAC of the lymph nodes picked up an unsuspected malignancy (primary or secondary). And to correlate the cytological findings with the histopathological findings in cases where lymph node biopsy is done.

## Materials and Methodology

**Type of the study and study setting:** It was a prospective study done on patient who presented with lymphadenopathy and referred to the Department of pathology Medical College Baroda, S.S.G. Hospital, Baroda for fine needle aspiration cytology and those underwent subsequent biopsy.

**Ethical consideration:** Human Research Ethics Committee permission was taken before starting of the study.

**Inclusion Criteria:** Patients with superficial as well as deep lymphadenopathies mainly referred by ENT, TB & Chest, Surgery, Paediatric, and Medicine departments of S.S.G. Hospital, Medical Collage Baroda.

**Exclusion Criteria:** Acellular fine needle aspirations were excluded from this study.

**Methods of collection of data:** All the referred patients were clinically examined and the procedure of aspiration biopsy was explained to the patient including reliability, limitations and complications. Patients were included in the study only after proper informed consent.

Aseptic precautions were taken and aspiration of the selected lymph node was done. After, the overlying skin was stretched, the lymph node was grasped between the index finger and the thumb of the left hand; a sterile 22 or 23 gauge needle fitted to a 10ml syringe was pierced

## Results

The present study deals with fine needle aspiration cytology of lymph nodes taken by cytology section and out of these cases, biopsy or excised lymph nodes taken by surgeon and sent to Histopathology section of pathology department.

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obliquely into the lymph node. The plunger was then withdrawn and the negative pressure was created in the syringe, after entering the lymph node mass. The needle was moved back and forth several times with a constant suction.

The negative pressure was released and the needle was removed from the mass. The needle containing the aspirated material was then detached and air was drawn into the syringe. After reattachment of the needle, content of the needle was ejected out on the clean, dry and grease free glass slides.

Smears were prepared using another glass slide exerting light pressure. The aspirate was examined for the amount and nature of the aspirated material, and then several smears were prepared. Smears were immediately fixed in 95% ethyl alcohol, and these smears were stained by haematoxylin and eosin stain, PAS stain. Air dried smears were also prepared and stained with MGG's stain.

Ziehl Neelsen stain was done for all the cases where necrotic material was aspirated or clinically suspected tuberculosis and HIV. Smears were examined and cytological diagnosis offered. Data regarding relevant radiological, biochemical and haematological investigations done for diagnostic purposes were collected.

Lymph nodes of the patients who underwent subsequent surgical biopsy were fixed in 10% formalin and subjected to gross examination. Biopsy specimens were routinely processed to obtain 3 – 6  $\mu$ m paraffin sections, which were stained with haematoxylin and eosin stains.

Special stains like Ziehl Neelsen stain, PAS were done when ever indicated.

For immunohistochemistry 4-5 $\mu$  sized sections of the formalin fixed paraffin embedded tissue was used. The sections were stained using the standard technique of immunohistochemistry. Study was done separately and then results of cytological and histopathological study were correlated to evaluate efficacy of the procedure.

**Statistical Analysis:** A simple descriptive data analysis method was done using Microsoft Excel.

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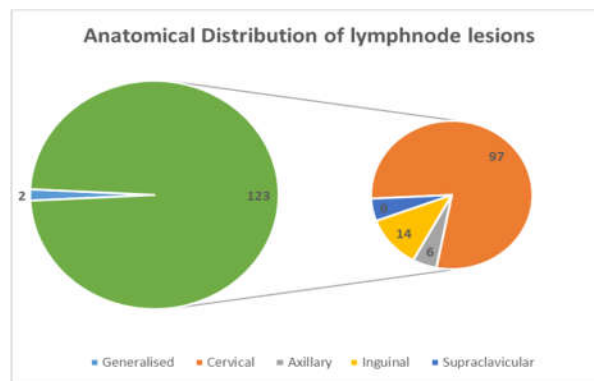
According to inclusion and exclusion criteria fine needle aspirations of 125 patients were considered for FNAC in the study and out of these 17 (13.6%) biopsies were evaluated for histopathology study.

In the current study gender wise distribution shows that, out of total 125 patients, 91 (73.60%) were Male patients and 34 (26.40%) were Female patients. Male to Female ratio was (2.79:1) with Male predominance. Age of patients was ranging from 0 to 80 years. Peak incidence of lymph node lesion was seen in the age group of 41 to 50 years (33 cases, 26.4%), followed by 51 to 60 years (29 Cases, 23.2%) and 61 to 70 (24 Cases, 19.2%) years. [Table 1]

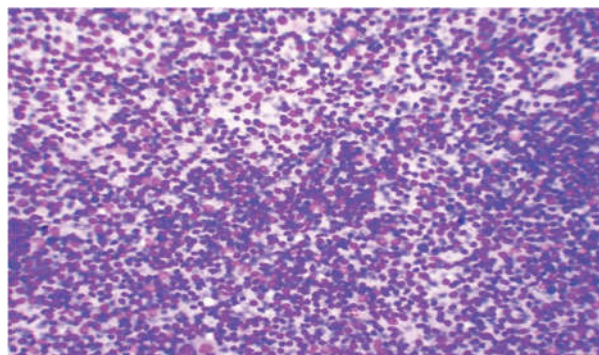
**Table-1: Age and Gender wise distribution of all cases of lymph node lesions (n=125).**

Age	Gender		No. of patients (%)
	Male	Female	
0 – 10	2	2	4 (3.2)
11 – 20	4	2	6 (4.8)
21 – 30	7	3	10 (8.0)
31 – 40	7	4	11 (8.8)
41 – 50	23	10	33 (26.4)
51 – 60	23	6	29 (23.2)
61 – 70	20	4	24 (19.2)
71 – 80	5	3	8 (6.4)
81 – 90	0	0	0 (0.0)
<b>Total</b>	<b>91 (73.60%)</b>	<b>34 (26.40%)</b>	<b>125 (100.0)</b>

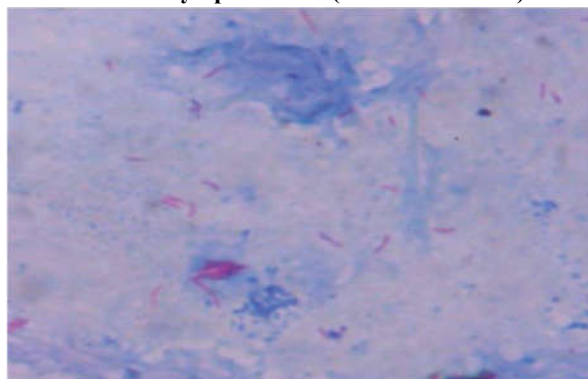
Anatomical distributions of all lymph node lesions shows highest numbers of sample were received from cervical site i.e. 97 (77.6%) followed by inguinal i.e. 14 (11.2%). However, 2 patients had generalized lymph node lesions. [Figure 1]



**Figure-1: Anatomical distribution of all lymph node lesions (n=125)**



**Figure-2: Smears shows polymorphous population of lymphoid cells in Reactive lymphadenitis (MGG stain x400)**



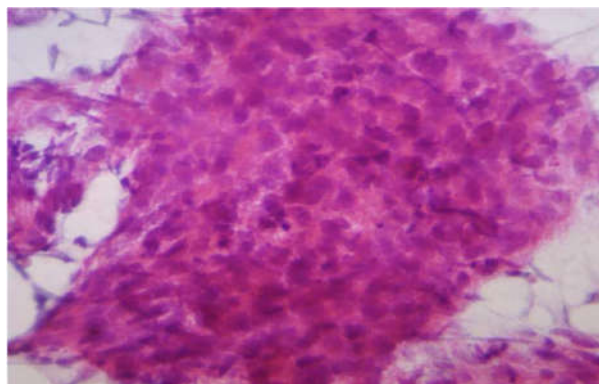
**Figure-3: Acid fast bacilli in tuberculosis lymphadenitis (ZN stain)(oil immersion)**

Out of all lymph node lesions neoplastic lesions were (83 cases, 66.40%) and Non neoplastic lesions were (42 cases, 33.60%). In non- neoplastic lesions Reactive lymphadenitis was most common (27 cases, 21.6%). [Figure 2] In the present study reactive lymphadenitis was most common in 11-20 years of age group (7cases; 25.92%) followed by 51-60 years of age (6 cases; 22.22%). Male to Female ratio for reactive lymphadenitis was 2:1 with male predominance. While tuberculosis lymphadenitis was most common in 21-30 years of age group (6 cases, 40%) followed by 31-40 years of age group (3cases, 20%). [Figure 3] Male to Female ratio was 1:1.5 with Female predominance. Among neoplastic lesions metastatic lesions were most common (79 cases, 63.2%) and only 4 cases had lymphoma. Lymphoma cases were seen only in Male patients. 1 case of Hodgkin lymphoma was seen in 0-10 year of age group, while rest of 3 cases of Non Hodgkin lymphoma were seen in 31-40 years of age group, 41-50 years of age group and 61-70 years of age group. [Table 2]

**Table-2: Cytological diagnosis of lymphnode lesions (n=125).**

Lymph node lesions	Number of cases	Percentage
<b>Non-neoplastic lesions</b>		
Reactive lymphadenitis	27	21.6%
Tuberculosis lymphadenitis	15	12.0%
<b>Neoplastic lesions</b>		
Metastatic Lesions	79	63.2%
NHL	3	2.4%
HL	1	0.8%
<b>Total</b>	<b>125</b>	<b>100%</b>

Neoplastic lesions were more common in cervical group (79 cases, 84.33%) followed by supraclavicular (5 cases, 6.02%). Metastatic squamous cell carcinoma was more common in cervical group (40 cases, 57.14%) followed by metastatic epithelial malignancy (15 cases, 21.34%).[Table 3] [Figure 4 & 5]



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Figure-4: Metastatic squamous cell carcinoma of lymph node (H&amp; E x400)

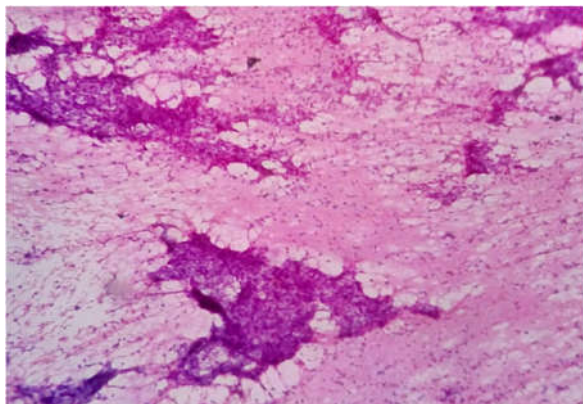


Figure-5: Metastatic Epithelial Malignancy of lymph node. (H&amp;E X 100)

Table-3: Distribution according to site and type of neoplastic lesions of lymph node. (N=83)

Cytological diagnosis	Cervical	Supraclavicular	Axillary	Inguinal	Total
Metastatic lesions					
Metastatic SCC	40	2	0	2	44
Metastatic adenocarcinoma	5	0	0	0	5
Metastatic epithelial malignancy	15	2	1	1	19
Malignant melanoma	0	0	0	1	1
Undifferentiated tumour	7	1	2	0	10
Primary tumour					
NHL	2	0	1	0	3
HL	1	0	0	0	1
<b>Total</b>	<b>70 (84.33%)</b>	<b>5 (6.03%)</b>	<b>4 (4.81%)</b>	<b>4(4.81%)</b>	<b>83 (100%)</b>

Table-4: Clinico-cytological correlation of all neoplastic lesions (n=83).

	Clinically suspected cases	Clinically unsuspected cases	Cytological diagnosis
Metastatic lesion			
Metastatic squamous cell carcinoma	26	18	44
Metastatic adenocarcinoma	3	2	5
Metastatic epithelial malignancy	10	9	19
Malignant melanoma	0	1	1
Undifferentiated tumour	5	5	10
Total	44 (55.70%)	35 (44.30%)	79
Primary tumours			
NHL	1	2	3
HL	0	1	1



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<b>Total</b>	<b>1 (25%)</b>	<b>3 (75%)</b>	<b>4</b>
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**Table-5: Correlation with cytology diagnosis with histopathological findings.**

Cytological Diagnosis	No of cases	HP correlated	HP not correlated	% of accuracy of cytology and histopathology
Reactive lymphadenitis	10	6	2 Tuberculosis lymphadenitis 1 HL 1 NHL	60%
Tuberculous lymphadenitis	3	2	1 HL mixed cellularity	66.67%
Metastatic carcinoma	4	3	1 No malignancy	75%

**Table-6: Diagnostic reliability of cytopathological diagnosis of lymphnode as compared with histopathological diagnosis in patients with lymphadenopathy.**

Statistical Parameter	Percentage	95%CI (%)
Sensitivity	76.92%	46.19% to 94.96%
Specificity	75.00%	19.41% to 99.37%
PPV	90.91%	64.09% to 98.25%
NPV	50.00%	24.19% to 75.81%
Accuracy	76.47%	50.10% to 93.19%

Out of 79 cases of cytological diagnosed metastatic lesions, 44 cases (55.69%) clinically suspected and 35 cases (44.30%) were clinically unsuspected cases of metastatic lesions. And Out of 4 cases cytological diagnosed of lymphoma, 1 case (25%) was clinically suspected and 3 cases (75%) were clinically unsuspected. [Table 4]

Cytological diagnosis was correlated with histopathology diagnosis in 17(13.6%) cases. Cytology diagnosis of 10 cases of reactive lymphadenitis correlated with histopathology diagnosis in 6 cases and accuracy rate was 60%. Cytology diagnosis of 3 cases of tuberculosis lymphadenitis correlated with 2 cases and accuracy rate was 66.67%. Cytology diagnosis of 4 cases of metastatic lesions correlated with histopathology diagnosis in 3 cases and accuracy was 75%. [Table 5]

Overall sensitivity of FNAC was 76.92%, specificity was 75.00%, positive predictive value was 90.91% and Negative predictive value was 50.00% and Accuracy was 76.47%. [Table 6]

## Discussion

Lymphadenopathy as a clinical manifestation of the regional or systemic disease serves as an excellent clue to the underlying disease. It can arise either from benign or malignant causes depending on the geographical condition and socioeconomic setup [5]. FNAC is a simple, safe, reliable, rapid, and inexpensive method of establishing the diagnosis of lesions and masses in various sites and organs. In the present study, a total 125 cases of FNAC of lymph nodes taken in cytology section and out of 17 (13.6%) cases of biopsy or excised lymph node taken by surgeon and sent to histopathology section Medical College Baroda during study period from November 2016 to October 2017.

Demographical distributions of the study show male were 73.60% and female were 26.40. These results were near comparable with Shruti Vimal et al [6] study in

which male were 54.55% and female were 45.46% and in study by Hirachand et al [5] in which male were 52.31% and female were 47.69%. Age wise distribution also similar to other studies like Hirachand et al [5] and Nesreen et al [6] with youngest patient in both study 3 and 4.5 years respectively and oldest patient was 85 and 80 years respectively that is nearly similar to the present study.

In present study, non -neoplastic lesions were 33.6% and neoplastic lesions were 66.4%. These results were comparable with Nesreen et al [6] study in which non-neoplastic lesions were 30.6% and neoplastic lesions

were 69.4% and with Steel et al [8] study in which non-neoplastic lesions were 34% and neoplastic lesions were 59%. In the present study most common site for lymph node lesions was cervical region 77.6%. These results were near comparable with Dr. Ripunjaya et al [9] in which 66.48% and Hirachand et al [5] in which 50.76%. In the present study reactive lymphadenitis was 21.6%. These results were near comparable with Khajura et al [10] in which reactive lymphadenitis was 37.1%. metastatic lesions of lymph node were 95.18%. These results were comparable with Alam et al [11] in which 90% and with Dr. Ripunjaya et al [9] study in which 82%. In the present study Male: Female ratio for metastatic lymph node lesions were 3.9:1.

These results were comparable with Mehrotra et al [12] in which Male: Female ratio was 3.8:1 and with Naresh et al [13] in which Male: Female ratio was 3.8:1. Cervical region was most common site for metastatic lesions were 84.81%. These results were near comparable with Pratibha et al [14] in which 75.2%. lymphoma cases were 3.2%. These results were comparable with Shruti Vimal et al [15] in which lymphoma were cases 2.67%.

In present study, clinically suspected malignant cases were 55.69% and clinically unsuspected cases were 44.30%. Similar results found by Ripunjaya et al [9] in which clinically suspected cases were 66.15% and clinically unsuspected cases were 18.46%. 75% primary malignant cases were clinically unsuspected and 25% cases were clinically suspected. While in Ripunjaya et al [9] study 42.88% cases were clinically unsuspected and 57% cases were clinically suspected. This deviation could be because of in present study clinically unsuspected cases were 75 % (3 cases), 1 case was child in which reactive lymphadenitis is more common and other 2 cases had past history suggestive of tuberculosis and HIV positive. So, clinician may not have suspect primary malignant lesions.

The accuracy rate for metastatic lesions was 75% near comparable with Ripunjaya et al [9] study in which accuracy rate for metastatic lesion was 100%. One case of metastatic lesion was not correlated with histopathology diagnosis in present study. It may be due to biopsy was taken very superficial from lesions. The accuracy rate for reactive lymphadenitis was 60% and in Ripunjaya et al study, accuracy rate for reactive lymphadenitis was 100%.

It may be due to in present study all non-tuberculosis cases were included in reactive lymphadenitis, while in Ripunjaya et al study, acute lymphadenitis cases in which accuracy rate was (57%) were taken separately

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from reactive lymphadenitis. In the present study (Tuberculosis, 3 Cases) accuracy rate for tuberculosis lymphadenitis was 66.67% (2 Cases), while in Ripunjaya et al study, in which accuracy rate for tuberculosis was 100%. In the present study third case of cytological diagnosed tuberculosis was also advised for excision biopsy for confirmation, as few atypical cells were suspicious, which was diagnosed malignant lymphoma in biopsy.

In the present study specificity and accuracy were 75% and 76.41% comparable with Nesreen et al in which specificity of was 67.2% and Accuracy was 82.2%. In the present study sensitivity was 76.92% near comparable with Nesreen et al study in which 90.9% [6].

### Conclusion

The recent trend in medical practice is toward adopting a diagnostic modality, which is both cost effective and minimally invasive. In this regard, FNAC is often used as a first line of investigation for screening cases with lymphadenopathy, since this method is easy to perform, rapid, and inexpensive. FNAC can help not only to differentiate among lymphoma, and metastasis, but also to identify nonspecific reactive lymphadenitis and specific infections such as tuberculosis lymphadenitis.

The results are quite encouraging and FNAC can be recommended as the initial diagnostic test in the evaluation of superficial lymphadenopathy. Although FNAC has proven to be a simple, safe, reliable and cost effective diagnostic tool for lymphadenopathies, the limitation of the procedure should be kept in mind and excision biopsy should be used whenever required. Immunohistochemistry staining is useful for confirmation of diagnosis in nodal lesions especially lymphoma and for further classification of lymphomas.

All authors had contributed equally in study design, conduct of study, data analysis and manuscript making.

**Findings:** Nil; **Conflict of Interest:** None initiated

**Permission from IRB:** Yes

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