

## Utility of Fine Needle Aspiration Cytology in Evaluation of Lymphadenopathy in a Tertiary Care Centre- Prospective Study

Manish Shukla<sup>1</sup>, Rishi Diwan<sup>2</sup>, Brajendra Shakyawal<sup>3</sup>

<sup>1</sup>PG Resident, Department of Pathology, Jhalawar Medical College, Jhalawar (Rajasthan)

<sup>2</sup>Senior Professor and HOD, Department of Pathology, Jhalawar Medical College, Jhalawar (Rajasthan)

<sup>3</sup>Associate Professor, Department of Pathology, Jhalawar Medical College, Jhalawar (Rajasthan)

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Corresponding Author: Dr. Manish Shukla

Conflict of interest: Nil

### Abstract:

**Background:** Lymphadenopathy is the enlargement of a lymph node and lymphadenitis is the inflammation in a lymph node. Lymphadenopathy is one of the most common clinical presentations of patients attending the outdoor department of a hospital. This study aims to study the lymph node lesions in various diseases by fine needle aspiration cytology and to prove FNAC as an important and useful preliminary diagnostic method in lymph node diseases

**Aims and Objectives:** To study the lymph node lesions in various diseases by fine needle aspiration cytology and categorise the various lymph node lesions into neoplastic and non-neoplastic lesions. Special stains like ZN stain was done for all clinically suspected cases. To prove FNAC as an important and useful preliminary diagnostic method in lymph node diseases.

**Methods:** The present study was a Prospective study. This Study was conducted for one Year from august 2022 to august 2023 at Department of Pathology, Jhalawar Medical College, Jhalawar, Rajasthan. Total 520 patients were included in this study and cytological diagnosis was made.

**Results:** Out of total 520 patients, 106 (20.4%) patients had Granulomatous Lymphadenitis, 7 (1.3%) patients had Lymphoproliferative Disorder, 70(13.5%) patients had Metastatic Lesion, 80 (15.4%) patients had Necrotising Granulomatous Lymphadenitis, 3 (0.6%) patients had Necrotising Lymphadenitis, 166 (31.8%) patients had Reactive Lymphadenitis, 6 (1.2%) patients had Suppurative Lymphadenitis and 82 (15.8%) patients had Tubercular Lymphadenitis.

**Conclusion:** We concluded that FNAC is a valuable initial diagnostic modality for evaluating lymphadenopathy in a tertiary care setting. It offers high diagnostic accuracy, particularly in distinguishing between benign and malignant conditions, thus guiding further management decisions. Its role in conjunction with clinical evaluation and histopathological examination is pivotal in providing timely and accurate diagnoses, thereby improving patient care outcomes.

**Keywords:** Fine Needle Aspiration Cytology, Lymphadenopathy, Granulomatous, ZN stain.

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### Introduction

Lymphadenopathy is the enlargement of a lymph node and lymphadenitis is the inflammation in a lymph node. Lymphadenopathy is one of the most common clinical presentations of patients attending the outdoor department of a hospital [1]. Lymph nodes are an integral component of the immune system and are located at anatomically constant points along the course of lymphatic vessels. Lymph nodes comprise an important part of the defence system of the human body. They are small, rounded, or kidney shaped nodules of lymphoid tissue that perform nonspecific filtration of particulate matter and micro-organisms from lymph. The various normal components of lymph node are Mature lymphocytes, Centrocytes, Immunoblasts, Plasma cells, Polymorphs, Eosinophils, Mast cells, Tingible body

macrophages. The common sites of distribution are Cervical, Axillary, Mediastinal, Retroperitoneal, Iliac and Inguinal region. They become secondarily involved in virtually all infectious diseases and in many neoplastic disorders, lipid storage diseases, endocrine disorders and in many miscellaneous conditions such as sarcoidosis and histiocytosis. The knowledge of the pattern of lymphadenopathy in a given geographical region is essential for making a confident diagnosis or suspecting a disease. Tuberculosis is the most common cause of lymphadenopathy in developing countries like India and should be considered in every case of granulomatous lymphadenopathy unless proved otherwise. In children and young adults, lymphadenopathy is generally due to viral or bacterial infections whereas malignant disorders

form the major cause of lymphadenopathy in those aged above 50 years. Localized or regional lymphadenopathy is frequently associated with viral infections, toxoplasmosis, connective tissue disorders, systemic lupus erythematosus, acute lymphoblastic leukemia, chronic lymphocytic leukemia, and lymphomas. In general practice, less than 1% of patients with peripheral lymphadenopathy have a malignant process. In comparison, retroperitoneal and intra-abdominal lymphadenopathy are usually malignant [2].

In the management of lymphadenopathy, Fine needle aspiration cytology (FNAC) has been accepted as a useful investigation. Lymph node aspiration is of great value for the diagnosis of lymphadenitis, lymphomas, and metastatic carcinoma. Fine needle aspiration cytology (FNAC) is a safe, reliable, rapid, and inexpensive method of establishing the diagnosis of a lesion and also helps in indicating the pattern of the investigation.

Fine needle aspiration cytology of the lymph node can be done by the physician, surgeon and the pathologists. However, it is always preferable that cytologist should do FNAC procedure to increase the accuracy.

Lymphadenopathy is a frequent occurrence in clinical settings. The diagnosis of enlarged lymph nodes solely by clinical judgment may be challenging, however, as the clinical symptoms of lymphadenopathy may be similar to those of other conditions. Although tissue biopsy is the most reliable diagnostic method of determining the cause of lymph node enlargement, this method is invasive and costly, limiting its application.

The limitations of tissue biopsy have led to the use of fine needle aspiration cytology (FNAC) as an initial diagnostic method at many institutions. However, it was not universally accepted, primarily due to a lack of rules and a classification for cytopathological diagnoses. For lymph node fine needle aspiration cytology (LN-FNAC), a group of cytopathologists has created a performance, category, and reporting system, the so-called Sydney system [3]. A better interdisciplinary understanding of the outcomes of this technique and a broader acceptance and utilization of LN-FNAC are both possible outcomes of this system [4]. The advantages of FNAC of lymph nodes in the initial diagnosis and the management of patients with lymphadenopathy include the early availability of results, simplicity, and minimal trauma with fewer complications [5].

FNAC has shown high accuracy in diagnosing reactive lymphoid hyperplasia, infectious diseases, granulomatous lymphadenitis, and metastatic malignancy. The diagnostic accuracy of FNAC, however, may be lower in patients with primary

lymphoproliferative disorders [6]. Early reports suggested that FNAC produced high false negative rates in patients with Hodgkin lymphoma (HL) and low-grade non-Hodgkin lymphoma. More recent studies have indicated that FNAC can accurately diagnose lymphoma in 85–90% of patients, particularly when ancillary techniques complement morphological assessment [7]. Ancillary techniques, such as immunohistochemistry (IHC), can overcome these difficulties and support the interpretation of cytological diagnoses. However, the role of FNAC in the initial diagnosis and subclassification of primary lymphoid malignancy remains unclear. A cytological diagnosis of lymphoma on FNAC is often followed by tissue biopsy [8].

Diagnosing tumors that have metastasized to the lymph nodes on cytological smears is crucial, as it may be the sole indication for searching for the primary tumor, especially in patients with occult carcinoma [9]. In most of these patients, however, the primary tumor has been identified clinically, with FNAC used widely for patient follow-up. Although most metastatic carcinomas can be identified solely by their cytomorphological characteristics, the features of different tumors may overlap, limiting the precise diagnosis of the primary tumor [10].

#### **Aims and Objectives:**

1. To study the lymph node lesions in various diseases by fine needle aspiration cytology.
2. To categorise the various lymph node lesions into neoplastic and non-neoplastic lesions.
3. Special stains like Z-N stain will be done for all clinically suspected cases of Tuberculosis.
4. To prove FNAC as an important and useful preliminary diagnostic method in lymph node diseases.

#### **Materials and Methods**

The present study was a Prospective study. This Study was conducted for one Year from august 2022 to august 2023 at Department of Pathology, Jhalawar Medical College, Jhalawar, Rajasthan. Total 520 patients were included in this study and cytological diagnosis was made. Inclusion criteria for the study were all the cases of lymph node lesions where FNAC was done.

Exclusion criteria included all the cases of lymph node lesion where adequate aspirate was not obtained even after repeated aspiration and if on microscopic examination, material was not to be found from lymph node, those cases were excluded from the study.

A detailed history regarding the complaints, the mode of presentation, and associated symptoms

will be obtained, a complete physical examination and examination of the enlarged lymph nodes will be made. For cytopathological diagnosis Fine Needle Aspiration will be done-

### Cytopathological Diagnosis

#### Fine Needle Aspiration Cytology

Fine needle aspiration technique was introduced by Greig and Grey[11]. It has been used as a diagnostic tool for the evaluation of superficial lesions since 1960. This technique is cost effective with a rapid turnaround time, relatively less traumatic and reliable[12]. The cytomorphologic diagnosis corroborate well with histological diagnosis, which is more specific and accurate. However HPE is relatively more expensive and time consuming[13] Hence FNAC is preferred as first line investigation for quick preliminary diagnosis[14].

FNAC was initially conceived as a means to confirm a clinical suspicion of local recurrence or metastasis of known cancer without subjecting the patient to further surgical intervention. The advantages of FNAC are that it is an outpatient procedure, does not require anaesthesia, cost effective and helps adequate preoperative planning. This study was undertaken to study the spectrum of lesions obtained on evaluation of lymphadenopathy in our tertiary care hospital, Jhalawar medical college, Jhalawar.

### Contraindications:

- Haemophilia or gross coagulation disorders
- Aneurysmal dilatation of blood vessels
- Hydatid cyst

### Check list for evaluation of the fine needle aspiration cytology (fnac) smear

1. **Clinical**
  - Chief complaints of the patient
  - Sex and age
  - Any pertinent sign
  - Location of the lesion
  - Radiological features
  - Laboratory data
  - Gross appearance of the aspirated material
2. **Cytological Data**
  - Cellularity
  - Cell arrangement or distribution
  - Cell population
  - Cell morphology
  - Background noncellular materials

### Results

**Table 1: Distribution of cases according to Age groups**

Age in Year	Frequency	Percent
0-10	113	21.7%
11-20	85	16.3%
21-30	108	20.8%
31-40	69	13.3%
41-50	42	8.1%
51-60	43	8.3%
61-70	37	7.1%
71-80	16	3.1%
81-90	7	1.3%
<b>Total</b>	<b>520</b>	<b>100.0%</b>

In our study, 113 (21.7%) patients were 0-10years of age, 85 (16.3%) patients were 11-20years of age, 108 (20.8%) patients were 21-30 years of age, 69 (13.3%) patients were 31-40 years of age, 42 (8.1%) patients were 41-50 years of age, 43 (8.3%) patients were 51-60 years of age, 37 (7.1%)

patients were 61-70 years of age, 16 (3.1%) patients were 71-80 years of age and 7 (1.3%) patients were 81-90 years of age.

The value of z is 10.2882. The value of p is < 0.00001. The result is significant at p < .05.

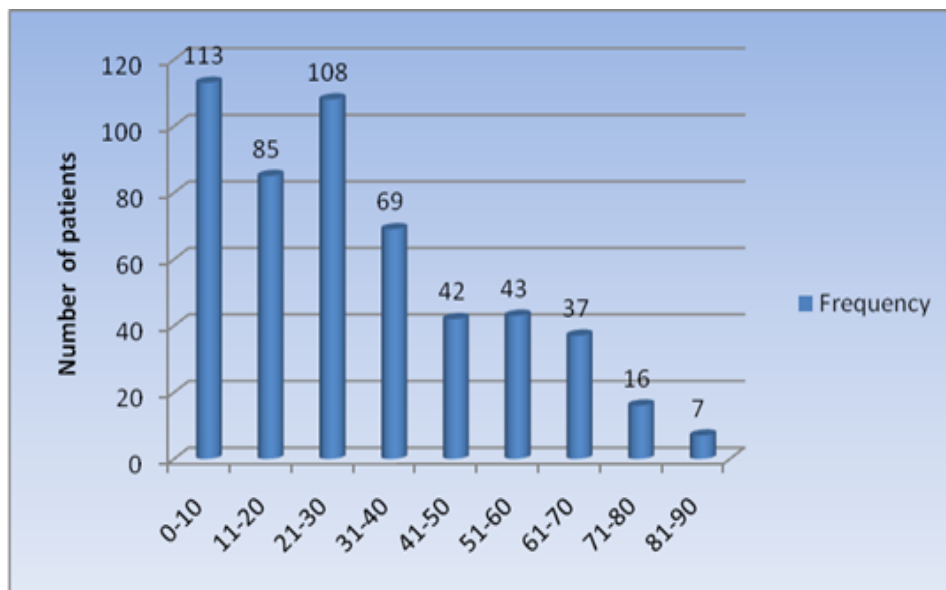


Chart 1: Distribution of cases according to Age groups

Table 2: Distribution of FNAC Diagnosis

FNAC Diagnosis	Frequency	Percent
Granulomatous Lymphadenitis	106	20.4%
Lymphoproliferative Disorder	7	1.3%
Metastatic Lesion	70	13.5%
Necrotising Granulomatous Lymphadenitis	80	15.4%
Necrotising Lymphadenitis	3	0.6%
Reactive Lymphadenitis	166	31.8%
Suppurative Lymphadenitis	6	1.2%
Tubercular Lymphadenitis	82	15.8%
<b>Total</b>	<b>520</b>	<b>100.0%</b>

In our study, 106 (20.4%) patients had Granulomatous Lymphadenitis, 7 (1.3%) patients had Lymphoproliferative Disorder, 70 (13.5%) patients had Metastatic Lesion, 80 (15.4%) patients had Necrotising Granulomatous Lymphadenitis, 3 (0.6%) patients had Necrotising Lymphadenitis,

166 (31.8%) patients had Reactive Lymphadenitis, 6 (1.2%) patients had Suppurative Lymphadenitis and 82 (15.8%) patients had Tubercular Lymphadenitis. The value of z is 10.4272. The value of p is < 0.00001. The result is significant at p < .05.

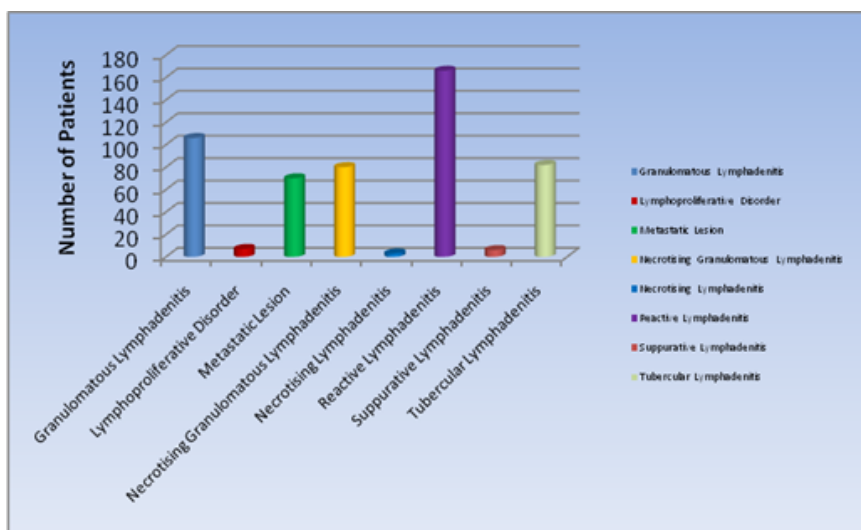
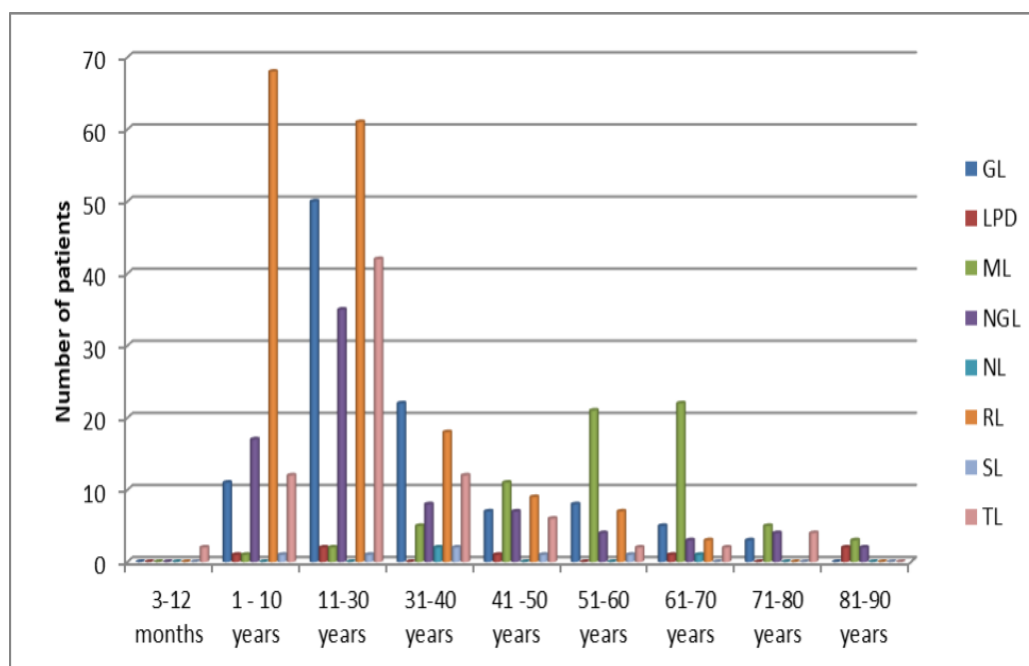


Chart 2: Distribution of FNAC Diagnosis

**Table 3: Distribution of FNAC Diagnosis according to Age**

FNAC Diagnosis	Age									
	3-12 months	1-10 years	11-30 years	31-40 years	41-50 years	51-60 years	61-70 years	71-80 years	81-90 years	Total
GL	0	11	50	22	7	8	5	3	0	106
LPD	0	1	2	0	1	0	1	0	2	7
ML	0	1	2	5	11	21	22	5	3	70
NGL	0	17	35	8	7	4	3	4	2	80
NL	0	0	0	2	0	0	1	0	0	3
RL	0	68	61	18	9	7	3	0	0	166
SL	0	1	1	2	1	1	0	0	0	6
TL	2	12	42	12	6	2	2	4	0	82
<b>TOTAL</b>	<b>2</b>	<b>111</b>	<b>193</b>	<b>69</b>	<b>42</b>	<b>43</b>	<b>37</b>	<b>16</b>	<b>7</b>	<b>520</b>
<b>P-Value</b>	<b>&lt;0.0001</b>									



**Chart 3: Distribution of FNAC Diagnosis according to Age**

**Table 4: Distribution of cases according to AFB staining**

AFB	Frequency	Percent
NA	243	46.7%
NS	195	37.5%
SEEN	82	15.8%
<b>Total</b>	<b>520</b>	<b>100.0%</b>

In our study, 195 (37.5%) patients had AFB not seen and 82 (15.8%) patients had AFB SEEN in AFB staining. The value of z is 10.7708. The value of p is < 0.00001. The result is significant at p < 0.05.

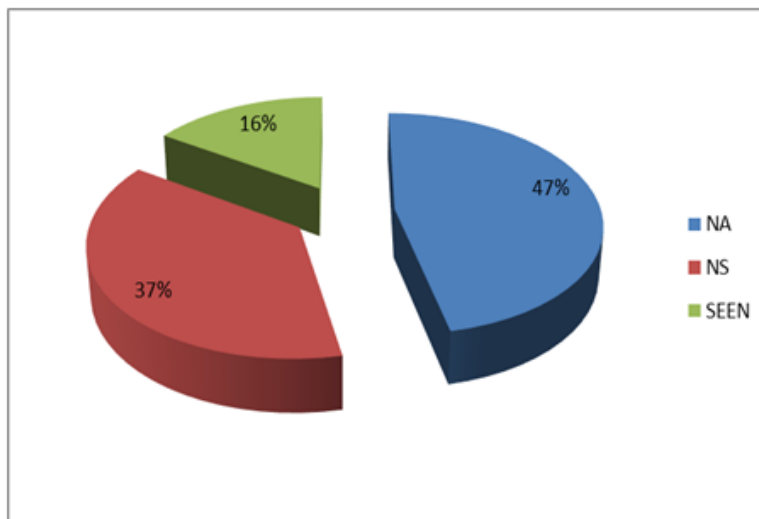


Chart 4: Distribution of cases according to AFB staining

Table 5: Distribution of Benign/ Malignant cases

Benign/ Malignant	Frequency	Percent
Benign	443	85.2%
Malignant	77	14.8%
Total	520	100.0%

In our study, 443 (85.2%) patients had Benign lesion and 77 (14.8%) patients had Malignant lesion. The value of z is 22.6984. The value of p is < 0.00001. The result is significant at p < 0.05.

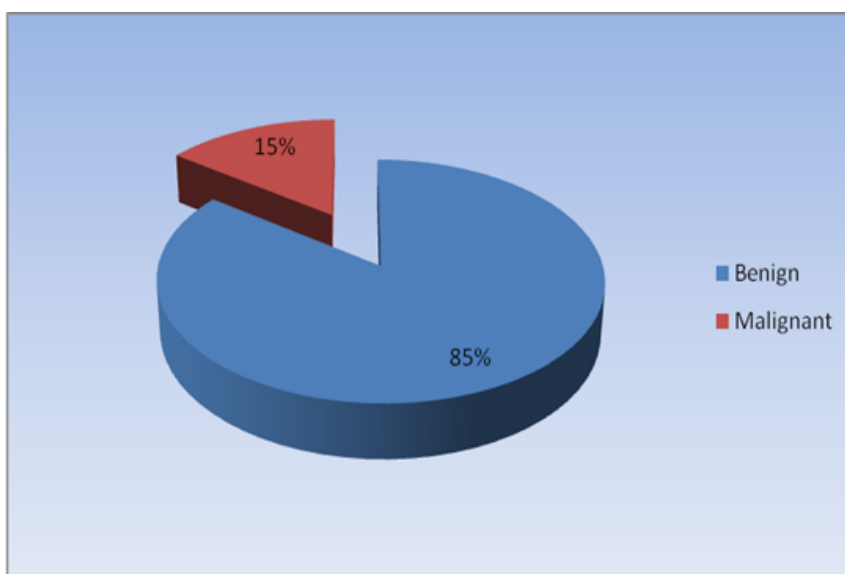


Chart 5: Distribution of Benign/ Malignant cases

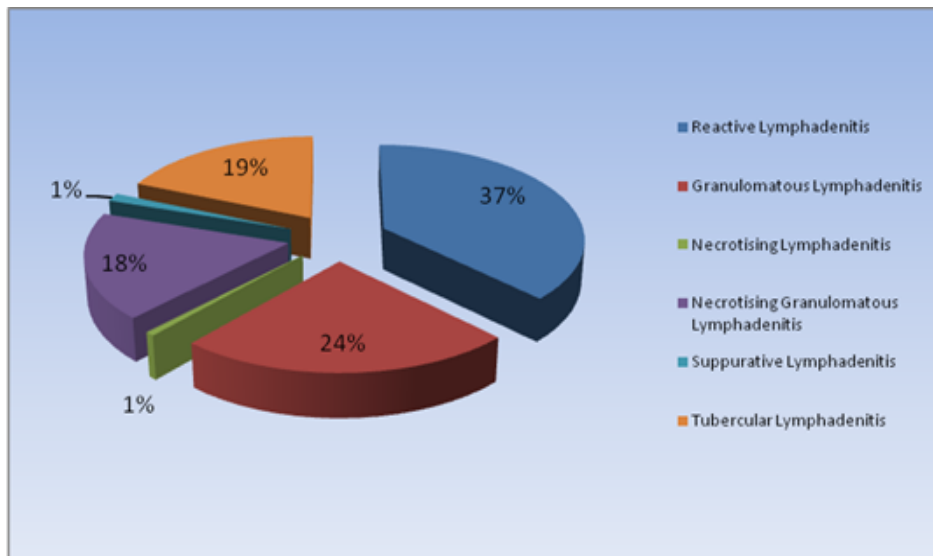
Table 6: Distribution of Benign cases

Benign Cases	Frequency	Percent
Reactive Lymphadenitis	166	37.55
Granulomatous Lymphadenitis	106	23.93
Necrotising Lymphadenitis	3	0.67
Necrotising Granulomatous Lymphadenitis	80	18.0
Suppurative Lymphadenitis	6	1.35
Tubercular Lymphadenitis	82	18.5
Total	443	100.0%

In our study, 166 (37.55) patients had Reactive Lymphadenitis, 106 (23.93%) patients had Granulomatous Lymphadenitis, 3 (0.67%) patients had Necrotising Lymphadenitis, 80 (18.0%) patients had Necrotising Granulomatous

Lymphadenitis, 6 (1.35%) patients had Suppurative Lymphadenitis and 82 (18.5%) patients had Tubercular Lymphadenitis.

The value of z is 13.701. The value of p is < 0.00001. The result is significant at  $p < 0.05$ .

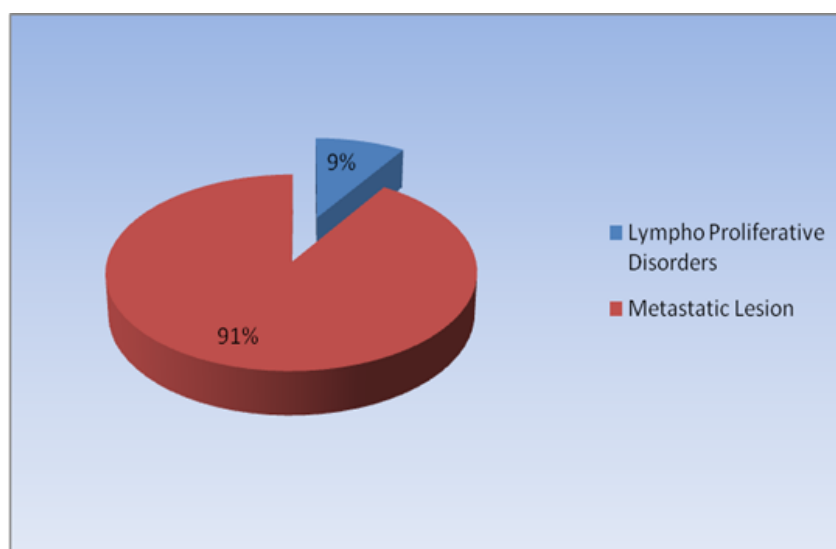


**Chart 6: Distribution of Benign cases**

**Table 7: Distribution of Malignant cases**

Malignant Cases	Frequency	Percent
Lympho-Proliferative Disorders	7	9.09%
Metastatic Lesion	70	90.91%
<b>Total</b>	<b>77</b>	<b>100.0%</b>

In our study, 7 (9.09%) patients had Lympho-Proliferative Disorders and 70 (90.91%) patients had Metastatic Lesion. The value of z is 10.1534. The value of p is < 0.00001. The result is significant at  $p < 0.05$ .



**Chart 7: Distribution of Malignant cases**

**Discussion**

The present study was a Prospective study. This Study was conducted from One Year at Department of Pathology, Jhalawar Medical College, Jhalawar,

Rajasthan. Total 520 patients were included in this study.

Sawaimul K et al [15] (2018) found that the study was conducted to evaluate FNAC as a diagnostic

tool in pediatric lymphadenopathy and study spectrum of various cytomorphological patterns in paediatric age group.

In our study, out of 520 patients most of the patients were 0-10 years old [113 (21.7%)]. Which was statistically significant ( $p < 0.00001$ ), ( $z=10.2882$ ).

Amit NK et al [16] (2016) found that the M:F in this study was 1:1.07, with a slight female preponderance.

We found that, male population was higher [271(52.1%)] than the female population [249(47.9%)]. Male: Female ratio was 1.08:1 but this was not statistically significant ( $p=.17384$ ).

Amit NK et al [16] (2016) found that cervical lymphadenopathy is a common clinical problem that confronts us in daily clinical practice.

We found that, most number of patients had right cervical site [157 (30.2%)] And left cervical site [124 (23.7%)] lymphadenopathy. It was statistically significant ( $p < 0.00001$ ), ( $z=13.3556$ ).

Mamatha K et al [17] (2017) observed that most of the cases were in the age group of 20-39years (32.7%) Reactive lymphadenitis was the commonest diagnosis on cytology constituting to 41.4% followed by malignant cases (26.3%), granulomatous lymphadenitis (17.7%), suppurative lymphadenitis (10%) and necrotizing lymphadenitis (3.6%).

We found that majority number of patients 166 (31.8%) had Reactive Lymphadenitis in our study of FNAC diagnosis, 106 (20.4%) patients had Granulomatous Lymphadenitis, 7 (1.3%) patients had Lymphoproliferative Disorder, 70 (13.5%) patients had Metastatic Lesion, 80 (15.4%) patients had Necrotising Granulomatous Lymphadenitis, 3 (0.6%) patients had Necrotising Lymphadenitis, 6 (1.2%) patients had Suppurative Lymphadenitis and 82 (15.8%) patients had Tubercular Lymphadenitis.

This was statistically significant ( $p < 0.00001$ ) ( $Z=10.4272$ ).

Hafez NH et al [18] (2011) showed that the cytological diagnoses were found to be benign in 48 cases (30.6%) and malignant in 109 cases (69.4%)

We found that, most number of patients had Benign lesion [443 (85.2%)]. It was statistically significant ( $p < 0.00001$ ), ( $z=22.6984$ )

Tandon P et al [19] (2016) found that reactive lymphadenitis was the predominant lesion in children. In adults, tubercular lymphadenitis was seen most frequently

We found that, most number of children had Reactive lymphadenitis. Most number of adults had Granulomatous and tubercular lymphadenitis. It was statistically significant ( $p < 0.00001$ ).

Mamatha K et al [17] (2017) observed that reactive lymphadenitis was the commonest diagnosis on cytology constituting to 41.4% followed by malignant cases (26.3%), granulomatous lymphadenitis (17.7%), suppurative lymphadenitis (10%) and necrotizing lymphadenitis (3.6%). Out of total 58 malignant cases, 51 (87.9%) cases were metastatic lesions, 4 cases were lymphoma and in 3 cases differential diagnosis of lymphoma/metastatic poorly differentiated carcinoma was considered.

We observed that, in benign lesion most number of patients had reactive lymphadenitis [166 (31.8%)] and in malignant lesion most number of patient had Metastatic deposits [70 (90.1%)]. It was statistically significant ( $p < 0.00001$ ), ( $z=10.1534$ ).

### Conclusion

In our study, out of 520 patients most of the patients were 0-10 years old. We found that, male population was higher than the female population, Male: Female ratio was 1.08:1. We found that, most number of patients had right cervical site lymph node enlargement and most number of patients had Reactive Lymphadenitis on FNAC diagnosis. We showed that, most number of patients had Benign lesion and among malignant cases most number of patients had Metastatic Lesion.

We concluded that FNAC is a valuable initial diagnostic modality for evaluating lymphadenopathy in a tertiary care setting. It offers high diagnostic accuracy, particularly in distinguishing between benign and malignant conditions, thus guiding further management decisions. Its role in conjunction with clinical evaluation and HPE is pivotal in providing timely and accurate diagnoses, thereby improving patient care outcomes.

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