



CYTOMORPHOLOGICAL SPECTRUM OF LYMPH NODE LESIONS DIAGNOSED BY FINE NEEDLE ASPIRATION CYTOLOGY IN A TERTIARY CARE CENTRE: A RETROSPECTIVE STUDY

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ABSTRACT **Background:** Lymphadenopathy is one of the most common clinical presentations encountered in medical practice and may arise due to a wide spectrum of pathological conditions ranging from inflammatory and infectious diseases to primary and metastatic malignancies. The etiological diagnosis of enlarged lymph nodes is crucial because the management and prognosis vary considerably according to the underlying pathology. Fine Needle Aspiration Cytology (FNAC) has emerged as a rapid, minimally invasive, cost-effective, and reliable diagnostic technique for the evaluation of lymphadenopathy. **Aim:** To study the cytomorphological spectrum of lymph node lesions diagnosed by Fine Needle Aspiration Cytology in patients presenting with cervical lymphadenopathy. **Objectives:** 1. To determine the distribution of various lymph node lesions in patients presenting with cervical lymphadenopathy. 2. To analyze the age and gender distribution of lymph node lesions. 3. To evaluate the utility of FNAC in the diagnosis of inflammatory and malignant lesions of lymph nodes. **Materials and Methods:** A retrospective study was conducted in the Department of Pathology, Atal Bihari Vajpayee Government Medical College, Vidisha, over a period of one year. A total of 150 cases of cervical lymphadenopathy were included. FNAC was performed in all cases, and smears stained with Papanicolaou and May-Grünwald Giemsa stains were examined microscopically. Cytological diagnosis was established based on standard cytomorphological criteria. **Results:** Among 150 cases, females constituted 58.7% and males 41.3% of cases. The majority of patients belonged to the age group of 21–30 years (29.3%). Chronic non-specific lymphadenitis was the commonest lesion (29%), followed by granulomatous lymphadenitis (24%) and tubercular lymphadenitis (22%). Malignant lesions comprised metastatic squamous cell carcinoma (9%) and Non-Hodgkin lymphoma (1%). **Conclusion:** FNAC is a simple, safe, rapid, and reliable diagnostic modality for the evaluation of cervical lymphadenopathy. It effectively differentiates inflammatory from malignant lesions and significantly contributes to early diagnosis and management.

KEYWORDS : Fine Needle Aspiration Cytology, Lymphadenopathy, Cervical lymph nodes, Tubercular lymphadenitis, Metastatic carcinoma.

INTRODUCTION

Lymph nodes constitute an important component of the immune system and act as filters for foreign antigens and neoplastic cells. Enlargement of lymph nodes is one of the most common clinical findings encountered in surgical and medical practice and may result from a wide variety of pathological processes including inflammatory, infectious, immunological, and neoplastic disorders.[1]

Cervical lymphadenopathy is particularly common because the cervical lymph nodes drain a large anatomical area including the upper respiratory tract, oral cavity, scalp, and neck structures. Evaluation of cervical lymphadenopathy is important because the causes range from benign self-limiting conditions to life-threatening malignancies.[2]

Fine Needle Aspiration Cytology (FNAC) was first introduced by Martin and Ellis in the 1930s and has since become an indispensable diagnostic tool in the evaluation of lymphadenopathy.[3] FNAC is widely accepted because it is minimally invasive, inexpensive, rapid, and can be performed in outpatient settings with minimal discomfort to the patient.

The technique provides valuable cytomorphological information and helps in distinguishing reactive and inflammatory lesions from primary and metastatic malignancies, thereby facilitating early diagnosis and management.[4]

In developing countries such as India, infectious causes constitute a major proportion of cervical lymphadenopathy. Tuberculosis continues to be a significant public health problem and remains one of the leading causes of granulomatous lymphadenitis.[5] Tubercular lymphadenitis is the most common form of extrapulmonary tuberculosis and commonly involves cervical lymph nodes.

Reactive lymphadenitis and chronic non-specific lymphadenitis are also frequently encountered, particularly in children and young adults, owing to repeated infections of the upper respiratory tract.[6]

Malignant lymph node lesions may arise either as primary lymphoid neoplasms or secondary metastatic deposits from distant primary tumors. Metastatic squamous cell carcinoma is among the most

common causes of malignant cervical lymphadenopathy in adults and is often associated with malignancies of the upper aerodigestive tract.[7]

Several studies have demonstrated high diagnostic accuracy of FNAC in the evaluation of lymphadenopathy, with sensitivity ranging from 85% to 98% and specificity approaching 100% for metastatic lesions.[8]

The present study was undertaken to analyze the cytomorphological spectrum of cervical lymph node lesions diagnosed by FNAC and to determine the distribution of various pathological entities according to age, gender, and microscopic findings.

MATERIALS AND METHODS

Study Design

The present study was a retrospective descriptive study conducted in the Cytology Section, Department of Pathology, Atal Bihari Vajpayee Government Medical College, Vidisha, Madhya Pradesh.

Study Duration

The study was conducted over a period of one year.

Study Population

Patients presenting with palpable cervical lymph node enlargement and referred from the Department of Surgery for Fine Needle Aspiration Cytology (FNAC) were included in the study.

Sample Size: A total of 150 cases of cervical lymphadenopathy were included.

Inclusion Criteria: All palpable lymph node swellings in the neck region sent for FNAC.

Exclusion Criteria:

- Inadequate smears.
- Poorly preserved aspirates unsuitable for cytological interpretation.

Procedure

Written informed consent was obtained from all patients. In patients below 18 years of age, consent was obtained from parents or legal guardians.

Fine Needle Aspiration Cytology was performed under aseptic precautions using a 22–23-gauge needle attached to a 10-mL disposable syringe.

The aspirated material was smeared onto clean glass slides and stained using:

- Papanicolaou stain
- May-Grünwald Giemsa (MGG) stain

In selected cases of suspected tubercular lymphadenitis, Ziehl-Neelsen staining for Acid-Fast Bacilli (AFB) was performed.

All smears were independently reviewed by two pathologists to minimize interobserver bias.

The results were analyzed according to:

1. Age
2. Gender
3. Cytomorphological diagnosis.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using descriptive statistics. Categorical variables were expressed as frequencies and percentages.

RESULTS

A total of 150 cases of cervical lymphadenopathy were evaluated by FNAC during the study period.

Gender-wise Distribution

- Female patients constituted the majority of cases, accounting for 58.7%, whereas males constituted 41.3%.
- The male-to-female ratio was approximately 1:1.4.

Age-wise Distribution

- The majority of patients belonged to the age group of 21–30 years (29.3%), followed by 11–20 years (24%).
- The mean age of presentation was in the third decade of life.
- Cytomorphological Spectrum of Lymph Node Lesions
- Inflammatory lesions constituted the majority of cases (90%), whereas malignant lesions accounted for 10%.

Inflammatory Lesions

- Chronic Non-specific Lymphadenitis
- Chronic non-specific lymphadenitis was the commonest lesion encountered and accounted for 29% of cases.

Smears showed:

- Mixed population of mature lymphocytes
- Plasma cells
- Histiocytes.

Reactive Lymphadenitis

Reactive lymphadenitis constituted 15% of cases.

The smears demonstrated:

- Polymorphous lymphoid population
- Numerous centroblasts and centrocytes
- Tingible body macrophages.

Granulomatous Lymphadenitis

Granulomatous lymphadenitis accounted for 24% of cases.

The smears showed:

- Epithelioid cell granulomas
- Langhans giant cells
- Background lymphocytes.
- Tubercular Lymphadenitis
- Tubercular lymphadenitis comprised 22% of cases.

Cytological features included:

- Caseous necrosis
- Epithelioid cell granulomas
- Langhans giant cells
- Positive Acid-Fast Bacilli in selected cases.

Malignant Lesions

Metastatic Squamous Cell Carcinoma

Metastatic squamous cell carcinoma constituted 9% of cases.

Smears showed:

- Pleomorphic malignant squamous cells
- Hyperchromatic nuclei
- Keratinized cytoplasm
- Tumor diathesis.

Non-Hodgkin Lymphoma

Non-Hodgkin lymphoma accounted for 1% of cases.

The smears showed:

- Monomorphic population of atypical lymphoid cells
- High nuclear-cytoplasmic ratio
- Prominent nucleoli.

Overall Distribution

- **Inflammatory lesions:** 135 cases (90%).
- **Malignant lesions:** 15 cases (10%).

Thus, inflammatory conditions constituted the predominant cause of cervical lymphadenopathy in the present study.

DISCUSSION

Lymphadenopathy is one of the most common clinical presentations encountered in routine medical practice and represents a diagnostic challenge because of its diverse etiologies ranging from benign reactive conditions to metastatic malignancies. Cervical lymph nodes are particularly prone to enlargement because they drain the upper respiratory tract, oral cavity, scalp, and neck structures. Accurate diagnosis of lymphadenopathy is essential for early management and improved patient outcomes.

Fine Needle Aspiration Cytology (FNAC) has emerged as an invaluable diagnostic modality for the evaluation of lymph node lesions because it is rapid, minimally invasive, inexpensive, and highly reliable. It provides valuable cytomorphological information and often obviates the need for excisional biopsy, especially in benign and inflammatory conditions.

The present study was undertaken to evaluate the cytomorphological spectrum of cervical lymph node lesions diagnosed by FNAC and to determine their distribution according to age, gender, and microscopic findings.

Gender Distribution

In the present study, females constituted 58.7% of cases, whereas males constituted 41.3%, with a male-to-female ratio of approximately 1:1.4.

A female preponderance has also been reported by Khajuria et al., Hirachand et al., and Ahmad et al. The higher incidence among females may be attributed to the increased prevalence of inflammatory and tubercular lymphadenitis in young women, particularly in developing countries.

However, certain studies have demonstrated a male predominance in cervical lymphadenopathy, especially in cases of metastatic malignancy owing to the higher prevalence of tobacco and alcohol consumption among males.

Age Distribution

The majority of patients in the present study belonged to the age group of 21–30 years (29.3%), followed by the age group of 11–20 years (24%).

These findings are comparable to studies conducted by Fatima et al., Hirachand et al., and Wilkinson et al., who also observed maximum incidence of cervical lymphadenopathy in the second and third decades of life.

The predominance of younger age groups in the present study may be explained by the high prevalence of inflammatory and tubercular lesions among adolescents and young adults.

Cytomorphological Spectrum of Lymph Node Lesions

Inflammatory lesions constituted 90% of all cases, whereas malignant lesions accounted for only 10%.

Similar findings have been reported by several Indian studies, emphasizing that inflammatory and infectious diseases remain the predominant causes of cervical lymphadenopathy in developing countries.

Chronic Non-Specific Lymphadenitis

Chronic non-specific lymphadenitis was the commonest lesion encountered in the present study and accounted for 29% of cases.

Similar observations have been reported by Khajuria et al., Patra et al., and Ahmad et al.

The cytological smears showed a mixed population of mature lymphocytes, plasma cells, and histiocytes.

Chronic non-specific lymphadenitis is usually associated with recurrent upper respiratory tract infections and chronic inflammatory conditions affecting the head and neck region.

Reactive Lymphadenitis

Reactive lymphadenitis constituted 15% of cases.

The cytological features included polymorphous lymphoid populations with tingible body macrophages and transformed lymphoid cells.

The frequency observed in the present study is comparable to that reported by Hirachand et al. and Shrestha et al.

Reactive lymphadenitis is particularly common among children and young adults and usually represents an immunological response to local or systemic infections.

Granulomatous Lymphadenitis

Granulomatous lymphadenitis accounted for 24% of cases.

The smears demonstrated epithelioid cell granulomas, giant cells, and background lymphocytes.

The findings are comparable with studies conducted in India and other developing countries where granulomatous inflammation constitutes an important cause of lymphadenopathy.

Granulomatous lymphadenitis may result from tuberculosis, sarcoidosis, fungal infections, and other chronic inflammatory disorders.

Tubercular Lymphadenitis

Tubercular lymphadenitis constituted 22% of cases.

India has one of the highest burdens of tuberculosis worldwide, and tubercular lymphadenitis remains the commonest form of extrapulmonary tuberculosis.

The cytological diagnosis was based on the presence of epithelioid cell granulomas, caseous necrosis, and Langhans giant cells.

Acid-Fast Bacilli positivity was observed in selected cases.

Several studies by Ahmad et al., Dasgupta et al., and Wilkinson et al. have similarly demonstrated a high prevalence of tubercular lymphadenitis among cervical lymph node lesions.

FNAC is particularly useful in the diagnosis of tubercular lymphadenitis because it enables early diagnosis and initiation of antitubercular therapy without requiring surgical biopsy.

Malignant Lesions

Malignant lesions constituted 10% of all cases.

Metastatic Squamous Cell Carcinoma

Metastatic squamous cell carcinoma accounted for 9% of cases and represented the commonest malignant lesion.

The cytological smears showed pleomorphic malignant squamous cells with hyperchromatic nuclei and keratinized cytoplasm.

Metastatic involvement of cervical lymph nodes commonly occurs from primary malignancies of the oral cavity, larynx, pharynx, and upper aerodigestive tract.

Several studies have similarly reported metastatic squamous cell carcinoma as the most common malignant lesion affecting cervical lymph nodes.

The diagnosis of metastatic disease by FNAC is of immense clinical importance because it allows rapid evaluation and guides further management.

Non-Hodgkin Lymphoma

Non-Hodgkin lymphoma constituted only 1% of cases.

The smears showed monomorphic populations of atypical lymphoid cells with prominent nucleoli.

Although FNAC is highly useful in suggesting lymphoma, definitive classification often requires histopathological examination, immunohistochemistry, and flow cytometry.

Utility of FNAC

- FNAC offers several advantages:
- Rapid diagnosis.
- Outpatient procedure.
- Minimal complications.
- Cost effectiveness.
- High diagnostic accuracy.
- Ability to differentiate inflammatory and malignant lesions.
- Reduction in unnecessary surgical biopsies.

Several studies have demonstrated sensitivity ranging from 85% to 98% and specificity approaching 100% for metastatic lesions.

The present study further supports the role of FNAC as an indispensable diagnostic tool in the evaluation of cervical lymphadenopathy.

Comparison with Other Studies

Table 1 shows the demographic profile and cytomorphological spectrum of cervical lymph node lesions diagnosed by FNAC

Variable	Category	Number of Cases (n)	Percentage (%)
Gender	Male	62	41.3
	Female	88	58.7
Age Group (Years)	0–10	21	14.0
	11–20	36	24.0
	21–30	44	29.3
	31–40	14	9.3
	41–50	12	8.0
	51–60	9	6.0
	61–70	8	5.3
	71–80	6	4.0
Cytomorphological Diagnosis	Chronic non-specific lymphadenitis	43	29.0
	Reactive lymphadenitis	23	15.3
	Granulomatous lymphadenitis	36	24.0
	Tubercular lymphadenitis	33	22.0
	Secondary from squamous cell carcinoma	13	8.7
	Non-Hodgkin lymphoma	2	1.3
Total Cases		150	100

Table 2. Comparison of Common Cytological Diagnoses

Study	Commonest Lesion
Khajuria et al.	Chronic non-specific lymphadenitis
Ahmad et al.	Reactive/Chronic inflammatory lesions
Hirachand et al.	Tubercular lymphadenitis
Present study	Chronic non-specific lymphadenitis

Table 3: Comparison of Frequency of Tubercular Lymphadenitis

Study	Frequency (%)
Dasgupta et al.	25
Ahmad et al.	20
Hirachand et al.	21
Present study	22

Table 4: Comparison of Malignant Lesions

Study	Frequency (%)
Patra et al.	8
Ahmad et al.	11
Present study	10

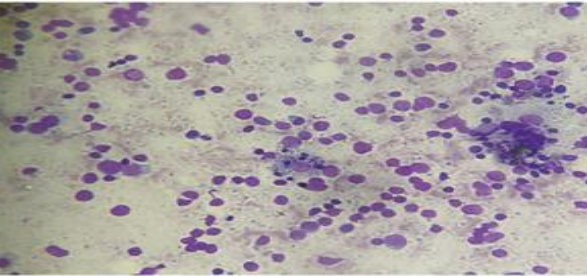
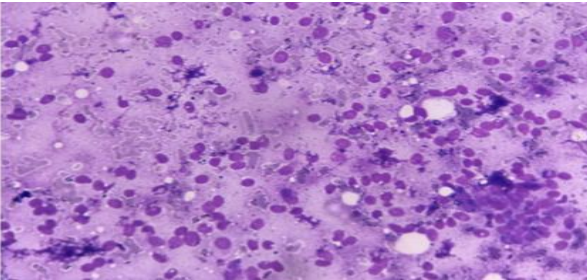


Fig 1. A- Reactive lymphadenitis



B- Chronic non-specific lymphadenitis

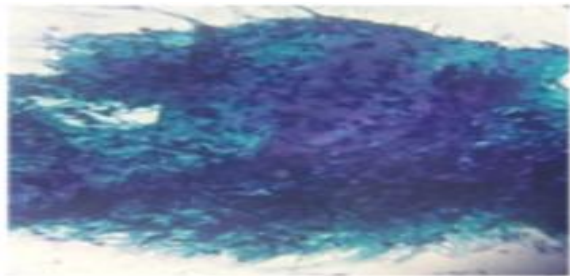
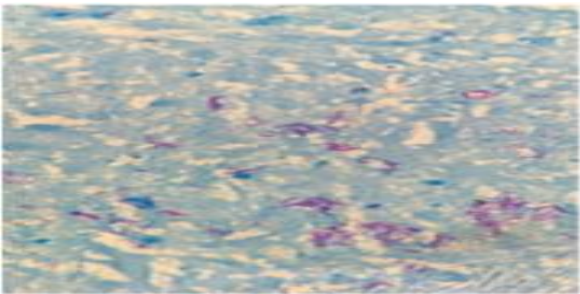
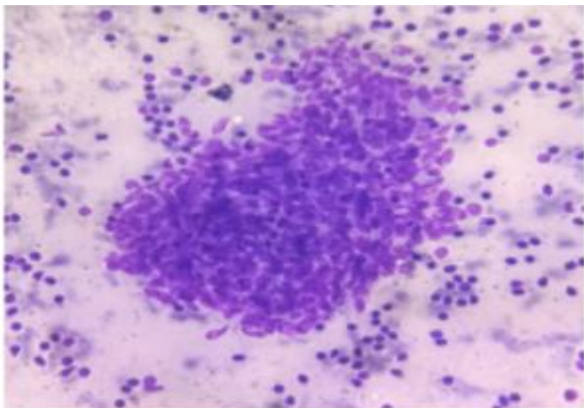


Fig 2. C- Tubercular lymphadenitis.



D- AFB positive in tubercular lymphadenitis.



E- Granulomatous lymphadenitis

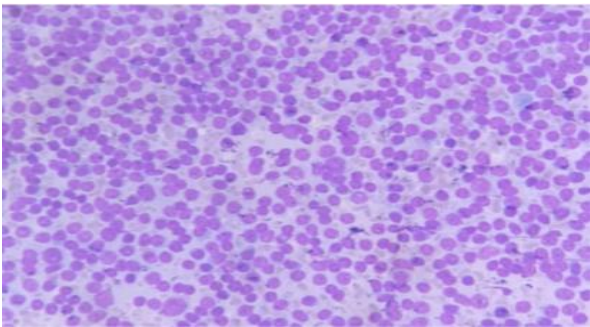
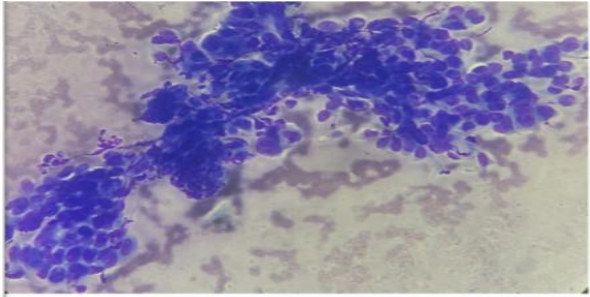


Fig 3. F- Non-Hodgkin Lymphoma



G- Secondary from squamous cell carcinomaomparison with Other Studies

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Sanchi Road, Vidisha (M.P. 466001)

Ref. No. 2/IEC/ABVGMCC/ Vidisha/ 2024 / Date: 08/08/2024

LETTER OF APPROVAL

This Institutional Ethics committee in its meeting held on 01/08/2024 has discussed the following research work Thesis Synopsis to be carried out at Atal Bihari Vajpayee Government Medical College Vidisha. The details of the proposed research work approved by the committee is as under:-

S.n o.	Name of candidate (PI & Co-INV)	Category (Speciality)	Topic of Research
1	PI : Dr. Preeti Uikay Guide: Dr.G.K Sawke Co-guide : Dr. Tina Rai	PG Dept. of Pathology ABVGMCC Vidisha	Study of fine needle aspiration cytology in palpable head and neck lesions in tertiary care centre.

This approval has been granted on the assumption that the proposed research work will be carried out in accordance with the ethical guidelines prescribed by Central Ethic committee on human research (C.E.C.H.R.).
Annual report of an ongoing project and final report of completed study should be submitted by P.I in the office of IEC.

Review type: ☒ New review ☐ Visited review ☐ Edited review

Members present:

IEC Members Present (date 1.03.2024)		IRC Member Present (date- 22.02.2024)	
1. DR. Asha Shrivastav – Chairman	IEC	Dr. Neeti Agrawal – Chairman	IRC
2. Mr. Atul Shah – Member	IEC	Dr. Anirudh Lagave – Member	IRC
3. Mr. Basant Maheshwari – Member	IEC	Dr. Akhilesh Kumar – Member	IRC
4. DR. Manju Jain – Member	IEC	Dr. Richa Nigam – Member	IRC
5. Dr. Prashant Shrivastav – Member	IEC	Dr. Shiv Kumar – Member	IRC
6. Dr. G.K Sawke – Member	IEC	Dr. Naina Wakode	
7. Dr. Sarat Singh – Member	IEC	Dr. Manish Nigam – Secretary	IRC
8. Dr. Rina Jain – Member	IEC		
9. Dr. Manish Nigam – Secretary	IEC		

Decision of the IEC: Recommended Recommended with suggestions ☒ Revision

Suggestions/ Reasons/ Remarks:

Copy to
1. Chairman, Institutional Ethics committee
2. PI/Guide

CHAIRMAN
INSTITUTIONAL ETHICS COMMITTEE
A. Dr. Neeti Agrawal
Chairman, IEC (P)
ABVGMCC Vidisha

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
Dr. Manish Nigam
ABVGMCC Vidisha

The findings of the present study are comparable with previously published Indian studies.

Limitations of the Study

- Single-center retrospective study.
- Relatively small sample size.
- Histopathological correlation was not available in all cases.
- Immunohistochemistry could not be performed in all cases of lymphoma.
- Long-term follow-up data were unavailable.

Despite these limitations, the present study provides valuable information regarding the spectrum of cervical lymph node lesions in our region.

CONCLUSION

The present study concludes that:

- FNAC is a simple, safe, rapid, and reliable diagnostic modality for

evaluating cervical lymphadenopathy.

- Inflammatory lesions constitute the majority of cervical lymph node lesions.
- Chronic non-specific lymphadenitis was the commonest lesion observed.
- Tubercular lymphadenitis continues to be an important cause of cervical lymphadenopathy in developing countries.
- Metastatic squamous cell carcinoma was the most common malignant lesion.
- FNAC effectively differentiates benign and malignant conditions and facilitates early diagnosis and treatment.
- The procedure significantly reduces the need for surgical biopsy in a large proportion of cases.

CONFLICT OF INTEREST: Nil.

SOURCE OF FUNDING: Nil.

ETHICAL APPROVAL: Institutional ethical guidelines were followed.

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