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Original Research Article

SPECTRUM OF CYTOMORPHOLOGICAL FEATURES IN PATIENTS OF LYMPHADENOPATHY AT A TERTIARY CARE CENTER IN NORTH CHHATTISGARH REGION – A 4-YEAR STUDY

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ABSTRACT

Background: FNAC serves as a window into the cytology of many lesions to arrive at a diagnosis, being a simple, rapid, cost-effective, and minimally invasive procedure. Lymphadenopathy is one of the most common presentations of underlying causes, ranging from treatable infectious etiology to malignancies. FNAC can be a useful tool for identifying such lesions that do not require surgical intervention with good certainty. The primary aim of the present study was to investigate the distribution of various lymph node lesions across different lymph node groups & their incidence pattern in various sex and age groups. **Materials and Methods:** The present study was done retrospectively between the period of January 2020 to December 2023 on patients evaluated by FNAC for superficial lymphadenopathies. 22–24-gauge needles with 5-10 ml syringes were used for aspiration. Smears from the aspirate were stained with Pap and Giemsa or Leishmann stains; their cytomorphology was studied along with the clinical findings, and a final diagnosis was made. **Result:** 200 cases of lymphadenopathy were assessed. The cervical group of lymph nodes (81%) was most commonly involved among both sexes. The most common age group affected was 11-30 years. Granulomatous lesion (37%) was the predominant etiology, followed by abscess (17%), whereas the least common was cold abscess (4.5%), followed by necrotizing lymphadenitis (5%). **Conclusion:** FNAC proves to be an effective tool to differentiate pathologic lesions without the patients undergoing unnecessary biopsies.

INTRODUCTION

Fine Needle Aspiration Cytology (FNAC) is a widely utilized diagnostic procedure that offers a window into the cytological characteristics of various lesions. It is recognized for being a simple, rapid, cost-effective, and minimally invasive method, making it highly suitable for initial evaluation in outpatient settings.[1,2] Among the many conditions evaluated through FNAC, lymphadenopathy remains one of the most common clinical presentations encountered in both primary care and tertiary centres.[3] Lymph node enlargement may result from a broad spectrum of underlying causes, including reactive inflammatory processes, infectious diseases such as tuberculosis, autoimmune conditions, and malignant neoplasms. Accurate and timely diagnosis of these etiologies is essential for effective patient management. FNAC plays a critical role in distinguishing between benign and malignant lesions, as well as specific infectious patterns, thus reducing the need for more invasive procedures like excisional biopsies. It provides valuable information with high diagnostic yield, allowing clinicians to initiate appropriate treatment promptly.

MATERIALS AND METHODS

This retrospective study was conducted over a period of four years, from January 2020 to December 2023, in the Department of Pathology at a tertiary care centre in North Chhattisgarh. A total of 200 patients presenting with superficial lymphadenopathy were included in the study. FNAC was performed using

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22–24-gauge disposable needles attached to 5–10 ml syringes. Multiple smears were prepared from the aspirated material and stained using Papanicolaou (Pap), Giemsa, and Leishman stains. The cytomorphological features of the smears were examined under light microscopy and interpreted in correlation with clinical details. Each case was categorized based on the underlying pathology, such as reactive, granulomatous, suppurative, or malignant lesions. Data on age, sex, and the anatomical location of the lymph nodes involved were also collected and analysed to study demographic trends and site-wise distribution of the lesions.

RESULTS

A total of 200 cases of superficial lymphadenopathy were evaluated during the study period, with a nearly equal distribution between male and female patients—98 males (49%) and 102 females (51%). The most commonly involved lymph node group was the cervical lymph nodes, accounting for 162 cases (81%), observed equally among both males and females (81 cases each). This was followed by the submandibular group, with 11 cases (5.5%), slightly more prevalent among females (7 cases) than males (4 cases). Other lymph node sites showed lower involvement with minor variations between genders. [Table 1]

The lymph node FNAC samples revealed a spectrum of lesions, with granulomatous lesions being the most frequent, observed in 74 cases (37%), followed by Reactive lymphadenitis found in 30 cases (15%), with a male predominance (19 males vs. 11 females). Tuberculous lymphadenitis, a specific type of granulomatous lesion, was reported in 31 cases (15.5%), more frequently in females (20 cases) than males (11 cases). Abscess formation was noted in 34 cases (17%), showing nearly equal gender distribution. Cold abscesses, often associated with tuberculous origin, were observed in 9 cases (4.5%), with a marked female predominance (7 cases). Necrotizing lymphadenitis accounted for 5% (10 cases), more common in females (7 cases).

Notably, malignant lesions were diagnosed in 12 cases (6%), with a significant male predominance (11 males vs. 1 female), indicating a higher suspicion of malignancy in male patients presenting with lymphadenopathy. [Table 2] All these lesions were metastatic, the deposits being of squamous cell carcinoma in 10 cases and of adenocarcinoma in 2 cases.

Table 1: Sites of lymph node involvement (n=200)

Lymph node involvement sites	Male	Female	Total
Cervical	81	81	162 (81%)
Submandibular	4	7	11 (5.5%)
Supraclavicular	2	3	5 (2.5%)
Axillary	4	4	8 (4%)
Inguinal	2	3	5 (2.5%)
Submental	4	1	5 (2.5%)
Total (%)	98(49%)	102(51%)	200 (100%)

Table 2: Cytological interpretation of all the cases in the present study (n=200)

Cytological Diagnosis	Male	Female	Total (%)
Reactive Lymph Node	19	11	30 (15%)
Granulomatous lesion	34	40	74 (37%)
Tuberculous lymphadenitis	11	20	31 (15.5%)
Necrotizing lymphadenitis	3	7	10 (5%)
Abscess	18	16	34 (17%)
Cold abscess	2	7	9 (4.5%)
Malignancy (Metastatic)	11	1	12 (6%)
Total	98	102	200 (100%)

Table 3: Age and sex wise distribution of cases in the present study

Age range	Reactive		Granulomatous		Tuberculous		Necrotizing		Abscess		Cold abscess		Malignancy		Total		Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	200
0-10	10	4	7	3	0	0	0	2	6	1	0	0	0	0	23	10	33
11-20	3	5	12	10	5	6	1	0	2	3	1	2	0	0	24	26	50
21-30	1	1	7	15	2	6	2	2	2	4	1	5	1	0	16	33	49
31-40	2	1	4	8	2	4	0	0	2	1	0	0	0	0	10	14	24
41-50	1	0	1	1	2	3	0	2	1	4	0	0	3	1	8	11	19
51-60	2	0	2	2	0	1	0	1	2	2	0	0	4	0	1	6	16
61-70	0	0	1	1	0	0	0	0	1	1	0	0	3	0	5	2	7
71-80	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	2

*M = Male

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*F = Female

The most commonly affected age group was 11–30 years, accounting for nearly half of all cases (49.5%). In children aged 0–10 years, reactive lymphadenitis was the most frequent finding, especially in males, followed by abscess formation and granulomatous lesions. In adolescents and young adults (11–20 years), granulomatous and tuberculous lymphadenitis. The 21–30 age group showed the highest number of granulomatous lesions, particularly among females, along with the highest occurrence of cold abscesses and early signs of malignancy. As age increased, particularly from 31 to 50 years, granulomatous and tuberculous lesions remained prevalent, but abscesses and necrotizing lymphadenitis were also noted. Importantly, malignancy started to appear more frequently in males over 40. In individuals aged 51–70 years, there was a marked increase in malignant lesions, especially among males, while reactive and granulomatous conditions became less frequent. In the elderly (71–80 years), although cases were fewer, both abscesses and malignancies were present [Table 3].

DISCUSSION

Histopathology remains the mainstay due to its diagnostic accuracy. However, tissue biopsy being an invasive and expensive method, Fine needle aspiration cytology (FNAC) of accessible enlarged lymph nodes is usually used as a primary diagnostic tool for the early identification of etiologies, especially in developing countries like India, due to its cost-effectiveness.[4-6] FNACs provide good sensitivity, specificity, positive and negative predictive values.[7] Also, research from Korea Cancer Center Hospital and Tertiary Care Centre in Saudi Arabia demonstrated that FNAC of lymph nodes had an overall diagnostic accuracy of 97.6% and 95.3% respectively.[6,7]

In the present study 200 cases were studied, 49% males and 51% females with nearly equal gender distribution of 1:1.04 that is comparable with 1:02 as noted by Sorokhaibum B et al,[5] and Biradar MV et al.[8] Studies by Patro P et al,[2] and Duraiswami R et al,[9] show a female predominance contrary to those by Padhiyar B et al,[3] Kumbhakar D,[10] and Mustaqueem SF et al,[11] with male predominance. The age ranged from 9 months to 80 years. The maximum number of cases was seen in young adults (11-30 years). Similarly, Sorokhaibum et al,[5] observed the maximum number of cases in the age range of 10-30 years. However, maximum cases were seen in </=15 years of age by Mustaqueem SF et al.[11]

Overall, cervical lymphadenopathy (81%) dominated across all age and sex groups, reinforcing its diagnostic importance in routine clinical cytology, which is in concordance with studies of Sidhaling Reddy et al,[1] Patro P et al,[2] Padhiyar Bet al,[3] Sorokhaibum B et al,[5] Gupta C et al,[12] from different parts of India. The second most common lymph node group affected was the submandibular group, similar to the study by Sidhaling Reddy et al.[1] Cytomorphology of most lymphadenopathies was non-neoplastic (94%), of which granulomatous lesions were most common, followed by reactive and tuberculous patterns [Table 2]. These inflammatory lesions were more common in the younger age group (<30 years), similar to the observation of Biradar MV et al,[8] & Sorokhaibum B et al.[5] In underdeveloped and developing countries like India, where tuberculosis is widespread, epithelioid granulomas without necrosis should be presumed to be tuberculous in origin—based on clinical history and presentation—unless a different diagnosis is confirmed.[5,13] This highlights tuberculosis as a leading cause of lymphadenopathy in the second and third decade of life, with female preponderance and decreasing prevalence with age in the present study, similar to the studies of Padhiyar B et al,[3] Patro P et al,[2] Chaudhari S et al,[13] and Kumbhakar D.[10] However, in the study from Sathe S et al,[14] metastases emerged as the second most common lesion after reactive lesions.

Of the neoplastic lesions (6%) in the present study, all (100%) were metastatic [Table 2]. The most commonly metastasized pathology is squamous cell carcinoma involving the cervical group of lymph nodes, which is a common finding in most of the other Indian studies.[1,5,8,10,12,14] It is in concordance with the extensive practice of tobacco use in the form of gudakhu and khaini consumption in the region among both sexes.[15]

Limitations

While FNAC is a valuable diagnostic tool, our study acknowledges certain limitations:

- **Sample Size:** The relatively small sample size may not fully represent the broader population.
- **Single-Centre Study:** Conducting the study in a single centre may limit the generalizability of the findings.
- **Lack of Molecular Confirmation:** The absence of molecular techniques like GeneXpert or culture methods limits the confirmation of TB cases.

CONCLUSION

In conclusion, our study corroborates the findings of recent Indian research, highlighting FNAC as an effective, minimally invasive diagnostic tool for evaluating superficial lymphadenopathy with limited resources. The high incidence of granulomatous lesions, particularly tuberculous lymphadenitis, underscores the continued prevalence of TB in India. These findings advocate for the integration of FNAC into routine clinical practice for the prompt and accurate diagnosis of lymphadenopathies.

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