

ORIGINAL RESEARCH

Characteristics of Patients with Lymphadenopathy Undergoing Fine-Needle Aspiration Biopsy at a Tertiary Hospital in Surabaya, Indonesia

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ABSTRACT

Background: Lymphadenopathy is a frequently observed clinical presentation in outpatient settings. Lymphadenopathy may arise from various etiologies, such as reactive lymphoid hyperplasia, infectious diseases, or malignant neoplasms. The first choice to diagnose superficial lymphadenopathy is usually fine needle aspiration biopsy (FNAB). The role of fine-needle aspiration biopsy (FNAB) in diagnosing superficial lymphadenopathy is to identify the specific type and potential origin of metastatic malignancy within the lymph node. **Objective:** This study aims to describe the characteristics of patients with lymphadenopathy who underwent fine-needle aspiration biopsy at Dr. Soetomo General Hospital. **Material and Method:** This is a descriptive retrospective study using secondary data from patients with lymphadenopathy who underwent fine-needle aspiration biopsy at the Laboratory of Anatomical Pathology of Dr. Soetomo General Hospital (January 2019-December 2019). **Result:** This study included 945 patients consisting of 410 males (43,4%) and 535 females (56,6%). Out of 945 cases, 499 (52.8%) were diagnosed as non-malignant lesions, 428 (45.3%) as malignant lesions, 11 (1.2%) as atypical cells, and 7 (0.7%) as inadequate. **Conclusion:** The most common patients with lymphadenopathy at Dr. Soetomo General Academic Hospital Surabaya were female patients aged 41-60, with mostly non-malignant lesions.

Highlights

1. This study provides a significant and large-scale demographic and diagnostic overview of lymphadenopathy in a major Indonesian tertiary referral hospital;
2. The findings reveal a critical near-equal split between malignant (45.3%) and non-malignant (52.8%) diagnoses, powerfully underscoring the indispensable role of FNAB as a first-line diagnostic tool.

BACKGROUND

Lymphadenopathy is a frequently observed clinical presentation in outpatient settings. Lymphadenopathy may arise from various etiologies, such as reactive lymphoid hyperplasia, infectious diseases, or malignant neoplasms (Ghate et al., 2018; Lee et al., 2023; Preethi et al., 2024). Fine-needle aspiration biopsy (FNAB) is usually the first-line test for diagnosing superficial lymphadenopathy (Andhika et al., 2023). Fine-needle aspiration biopsy (FNAB) has a significant role in diagnosing superficial lymphadenopathy to identify the specific type and potential origin of metastatic malignancy within the lymph node. The diagnostic accuracy of fine-needle aspiration biopsy (FNAB) in metastatic malignancy is about 90–95% (Bhunja et al., 2022). Compared to surgical biopsy, FNAB provides a rapid preliminary diagnosis for lymphadenopathy with minimal patient discomfort and lower cost (Lee et al., 2023; Preethi et al., 2024). The pioneering publications by Zajicek, Franzen, Esposti, and Lowhagen from the Karolinska Hospital in Stockholm as early as 1947 have gained international recognition for the technique of aspiration cytology (Pujani et al., 2016). A large number of patients with lymphadenopathy have been investigated by FNAB at our hospital.

Neoplastic or metastatic lesions from infectious or reactive lymphadenopathies can be differentiated using FNAB (Goyal et al., 2017). Consequently, the FNAB procedure has been widely accepted and routinely implemented in the diagnostic evaluation of lymphadenopathy. Although FNAB is recommended as a first-line diagnostic tool for clinically significant lymphadenopathy, there is currently no published evidence assessing its diagnostic performance in the Surabaya region.

OBJECTIVE

This study aims to describe the characteristics of patients with lymphadenopathy undergoing FNAB in Dr. Soetomo General Academic Hospital, Surabaya, Indonesia.

MATERIAL AND METHODS

Study design

This study is a descriptive retrospective study, using secondary data of patients with lymphadenopathy who underwent fine needle aspiration biopsy at the Laboratory of Anatomical Pathology of Dr. Soetomo General Hospital (January 2019–December 2019).

Data collection

Medical records and cytology smears were reviewed. Sex and age data were collected. To ensure the diagnostic accuracy of fine needle aspiration biopsy, the entire smears underwent blind re-evaluation by an anatomical pathologist.

Data analysis

Categorical variables will be presented as frequencies and percentages



RESULTS

This study included 945 patients consist of 410 male (43,4%) and 535 female (56,6%) with ratio 1:1.3. The mean patient age was 39.76 years (range: 1-80), with age distribution peaking in the 41-50 year group (18.8%, n=178), followed by 51-60 year group (18.2%, n=172), 21-30 year group (16,2%, n=153), 31-40 year group (13.0%, n=123), 61-70 year group (11.9%, n=112), 11-20 year group (10.1%, n=95), 0-10 year group (8.3%, n=78), 71-80 year group (3.1%, n=29), and 81-90 year group (0.50%, n=5) as showed in table 1.

Table 1. Age distribution in lymphadenopathy patients

Age	N	%
0-10	78	8.3
11-20	95	10.1
21-30	153	16.2
31-40	123	13.0
41-50	178	18.8
51-60	172	18.2
61-70	112	11.9
71-80	29	3.1
81-90	5	0.5
TOTAL	945	100

The most commonly affected lymph nodes were the neck (59%, n=611), followed by axillary (11%, n=114), supraclavicular (9%, n=93), submandibular (6%, n=60), inguinal (5%, n=50), along with infraauricular (5%, n=47), and infraclavicular (1%, n=7).

Table 2. Location of lymphadenopathy

Region	N	%
Neck	611	59
Axillary	114	11
Supraclavicle	93	9
Inguinal	50	5
Infraclavicle	7	1
TOTAL	945	100

Out of 945 cases, 499 (52.8%) cases were diagnosed as non-malignant lesions, 428 (45.3%) cases were diagnosed as malignant lesions, 11 (1.2%) cases were diagnosed as atypical cells, and 7 (0.7%) cases were inadequate. In malignant lesions, 321 out of 428 cases (75.0%) were diagnosed as metastatic malignancies, 60 out of 428 cases (14.0%) were diagnosed as lymphoid malignancies, and 47 out of 428 cases (11.0%) were diagnosed as malignant round cell tumor (Table 3).

Table 3. Diagnosis of lymphadenopathy patients

Diagnosis	F	M	Total
Metastatic malignancy			
Adenocarcinoma	121	21	142
Squamous cell carcinoma	29	30	59
Poorly differentiated carcinoma	14	13	27
Undifferentiated carcinoma	9	31	40
Papillary thyroid carcinoma	13	9	22
Follicular thyroid carcinoma	1	1	2
Malignant melanoma	5	4	9
Malignant phyllodes tumor	1	0	1
Sebaceous carcinoma	0	1	1
Adenosquamous carcinoma	1	0	1
Anaplastic carcinoma	1	0	1
Medullary thyroid carcinoma	0	1	1
Small cell carcinoma	0	1	1
Metaplastic carcinoma	1	0	1
Seminoma	0	1	1
Basal cell carcinoma	0	1	1
Difficult to determined	4	7	11
Lymphoma malignancies			
Non-hodgkin lymphoma	19	31	50
Hodgkin lymphoma	4	6	10
Total	223	158	381

DISCUSSION

Evaluating lymph node (LN) involvement in neoplastic disease is crucial for accurate tumor staging and therapeutic planning. Nevertheless, lymphadenopathy often presents a diagnostic challenge for clinicians (Facciorusso et al., 2021). Fine-needle aspiration biopsy (FNAB) remains a simple, safe, and reliable technique for cytological diagnosis. However, FNAB has limitations, with reported failure rates as high as 45%. Fine-needle aspiration biopsy (FNAB) with adequate material may still be inconclusive due to several factors, such as inadequate smear spreading, air-drying artifacts, or thick tissue fragments (Chong et al., 2023).

Age and Sex Distribution

The demographic data revealed that the demographic data revealed that majority of patients are female (56.6%), with a female-to-male ratio of 1.3:1. The patients' mean age was 39.76 years, and the highest frequency was observed in the fourth to sixth decades of life (ages 41-60). Age distribution in lymphadenopathy is highly significant, as it represents the peak incidence for both reactive lymphoid disorders and the onset of malignancies (Montégut et al., 2024). Several studies indicate that lymph nodes in humans undergo alterations with age. The peak incidence in the present study was found to be between 41-60 years, which was similar to other studies (Bhunja et al., 2022). There was an increased incidence in males, which was comparable to other studies (Bhunja et al., 2022). Lymphadenopathy in young adults (ages 21-40) is often related to infectious etiologies like tuberculosis, which is endemic in Indonesia (Lestari et al., 2022).

Location

The most frequent site of lymphadenopathy is the cervical region (59%), followed by the axillary region (11%). This finding is consistent with studies worldwide and aligns with the anatomy of lymphatic drainage (Malhotra et al., 2017; Karaman et al., 2020; Hanzalová and Matter, 2024). Lymph nodes in the cervical region are the most frequent site for reactive hyperplasia, infections (e.g., tuberculosis, viral infections), and metastases from head and neck malignancies, thyroid malignancies, and distant primaries.

Diagnosis

This study found that the distribution between non-malignant (52.8%) and malignant (45.3%) diagnoses is nearly equal. This high rate of malignancy diagnosis indicates the effectiveness of FNAB as a first-line screening tool in a tertiary care setting (Zufry et al., 2023), where large numbers of patients are referred with a high suspicion of malignancy. Fine-needle aspiration biopsy (FNAB) allows for rapid triage and further management planning in malignant process since its effectiveness in identifying malignancy in nearly half of all patients. A high technical success rate and diagnostic adequacy are indicated by the diagnosis of atypical (1.2%) and inadequate (0.7%) samples, which is commendable regarding the large sample size.

The majority diagnosis in malignant processes is metastatic carcinoma (75.0%), which far exceeds primary lymphoid malignancies (lymphoma) at 14.0%. These findings indicate the technique's high sensitivity in identifying metastatic deposits (Rus et al., 2024). The spectrum of metastatic carcinomas is particularly insightful. The adenocarcinomas cases (n=142) strongly indicate primary origins in the lungs, breast, or gastrointestinal tract (Krämer et al., 2023). The squamous cell carcinoma cases (n=59) strongly indicate metastases from head and neck malignancy, which is common in the Southeast Asia region (Barsouk et al., 2023). Notably, the papillary thyroid carcinoma cases (n=22) indicate that one of the common causes of cervical lymphadenopathy is thyroid malignancy. The gender distribution within these subtypes is also revealing; the adenocarcinoma cases were far more common in females, which is suggestive of metastases from breast cancer (Luo et al., 2023), while certain other carcinomas showed a male predominance.

Fine-needle aspiration biopsy (FNAB) as a single diagnostic workup of lymphoma can be challenging and often requires ancillary studies like flow cytometry or core biopsy for subtyping (Abbott et al., 2022; Caraway, 2015). In this study, Hodgkin and Non-Hodgkin lymphoma (n=60) likely represent cases where cytomorphology was highly suggestive. This finding highlights the limitation of FNAB and a critical area for clinicopathological correlation (Foshat et al., 2019).

Limitations

Despite its retrospective nature, this study provides several important strengths. A large-scale demographic and diagnostic overview of lymphadenopathy is the first strength of this study. The findings reveal a critical near-equal split between malignant and non-malignant diagnoses, powerfully underscoring the indispensable role of FNAB as a first-line diagnostic tool become the second strength of this study. Several limitations are inherent to its retrospective design. Firstly, the definitive histopathological correlation (from subsequent excisional biopsies), which is the gold standard for confirming FNAB diagnoses, especially for lymphomas and atypical cases, was not available for all cases. Secondly, the lack of ancillary data, such as serological tests for infectious diseases (e.g., HIV, TB) or data on patients' HIV status, limits a deeper etiological analysis of the reactive cases. Finally, the patient population is inherently biased towards more complex or suspicious cases, which explains the high malignancy rate and may not be generalizable to primary care settings.

CONCLUSION

Our study demonstrates that in a tertiary hospital in Surabaya, superficial lymphadenopathy evaluated by FNAB predominantly affects middle-aged adults and females, with the neck being the most common site. FNAB proved to be an excellent first-line diagnostic tool, effectively differentiating between non-malignant and malignant processes in over 98% of cases. The high yield of metastatic carcinoma underscores the importance of a systematic evaluation for a primary tumor following a malignant FNAB diagnosis. Future prospective studies incorporating histopathological correlation and ancillary tests would further refine diagnostic accuracy and provide a more detailed understanding of the etiological landscape of lymphadenopathy in Indonesia.

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Conflict of Interest

The authors declare no conflict of interest.

Ethical Clearance

Ethical clearance for this study was obtained from the Institutional Ethics Committee of Dr. Soetomo General Academic Hospital, with approval number 3912/120/4/IX/2025. This study was a retrospective analysis of anonymized cytopathology records; therefore, informed consent was not required. All data were analyzed with high confidentiality, and no personal identifiers were used.

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Author(s) Contribution

ZN: composing, compiling, data analysis, interpreting, funding; ASS: concept development, translating, revising; NK: inspection, amendment

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