

Pattern of Breast Diseases in Western Nepal: A Fine-needle Aspiration Cytology-based Descriptive Study

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ABSTRACT:

Introduction: Palpable breast lumps are the commonest presentation of breast diseases. Fine-needle aspiration cytology (FNAC) is a simple, rapid, and safe diagnostic method. Previously, no uniform reporting criteria existed. The International Academy of Cytology (IAC) Yokohama System was introduced to address this. This study aimed to categorize breast FNAC cases using the IAC Yokohama System and evaluate associations between clinical variables and FNAC findings. **Methods:** This retrospective study was conducted at Lumbini Medical College and Teaching Hospital, where records of breast lesions undergoing FNAC in the last year were studied. Eighty-five patients with palpable breast lesions who underwent FNAC were included. Cytological diagnoses were categorized per the IAC Yokohama System. Chi-square and Fisher's exact tests assessed associations between clinical variables (consistency, mobility, tenderness) and FNAC findings. **Results:** Mean age was 44.9 ± 17.5 years (range: 10–90). Among 80 evaluable cases, 72 (90%) were female. Left-sided lesions (57.7%) outnumbered right-sided (38.8%). Cytological distribution: inadequate (C1)–5(5.9%); benign (C2)–52(61.2%); atypical (C3)–6(7.1%); suspicious (C4)–2(2.4%); and malignant (C5)–20(23.5%). Fibroadenoma was the commonest benign lesion; ductal carcinoma the predominant malignant subtype. Significant associations were observed between FNAC diagnosis and consistency ($p < 0.0001$), mobility ($p < 0.001$), and tenderness ($p = 0.005$). **Conclusions:** Benign lesions (61.2%) predominated over malignant (23.5%), with fibroadenoma and ductal carcinoma being the commonest diagnoses. FNAC diagnosis showed significant associations with consistency, mobility, and tenderness. The IAC Yokohama System effectively categorized all cases.

Keywords: Breast lesions; Cytology; FNAC; IAC system; Yokohama system.

INTRODUCTION:

Breast lumps in women encompass a spectrum of benign and malignant lesions.¹ Carcinoma of the breast is one of the most common

malignancies in women worldwide and a major cause of mortality and morbidity.² In developing countries, it is the leading cause of cancer-related death in women, whereas in developed nations, it ranks second, after lung cancer.³ According to the Global Cancer Observatory (GLOBOCAN) 2020 data, breast carcinoma is the second most common cancer among Nepalese women of all ages, accounting for 17.1% of all female cancers.⁴

The three main modalities for diagnosing breast lumps are clinical examination, radiological imaging, and cytological examination.⁵ Fine-needle aspiration cytology (FNAC) is a simple, non-invasive, cost-effective, and rapid procedure for differentiating benign from malignant breast lesions.⁶ In May 2016, the International Academy of Cytology (IAC) introduced the Yokohama System for reporting breast FNAC, which classifies lesions into five clearly defined categories: inadequate, benign, atypical/probably benign, suspicious of malignancy, and malignant.^{5,7–9} Currently, most

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institutions outside Nepal have adopted this system to ensure uniformity in reporting.⁹

The present study aimed to classify breast FNAC findings according to the IAC Yokohama System, thereby providing standardized reports for better clinical interpretation and patient management. Additionally, we sought to evaluate whether an association exists between clinical variables (consistency, tenderness, and mobility) and FNAC diagnostic categories.

METHODS:

This retrospective descriptive study was conducted at the Department of Pathology, Lumbini Medical College and Teaching Hospital (LMCTH) during June 2025 and July 2026. During this period, medical records of eligible participants presented to the hospital over the last year (June 2025 to May 2026) were reviewed. Ethical approval was obtained from the Institutional Review Committee (IRC) with reference number 56/26/V1.R1.

The sample size was calculated based on a previous study by Pathak et al., which reported a malignancy prevalence of 11.7% among breast lesions.⁶ Using the formula for cross-sectional studies: $n = Z^2 \times p \times (1-p) / e^2$, where $Z = 1.96$ (95% confidence level), $p = 0.117$, and $e = 0.07$ (margin of error), the minimum required sample size was 81. To account for possible exclusions or incomplete data, we enrolled 85 cases that met the inclusion criteria during the study period.

All patients presenting with palpable breast lesions who underwent blind or ultrasound-guided FNAC at the pathology department were included. Patients with a prior diagnosis of breast carcinoma or those who had received previous treatment for breast cancer were excluded.

Clinical variables recorded included laterality, mobility, tenderness, and consistency. FNAC diagnoses were initially classified as benign or malignant and then further subcategorized according to the IAC Yokohama System into five groups: inadequate, benign, atypical/probably benign, suspicious, and malignant.

Data were collected using a pre-designed proforma and entered into Microsoft Excel. Statistical analysis was performed using PSPP version 2.1.1. Descriptive statistics (mean, standard deviation, frequency, and percentage) were computed. The chi-square test and Fisher's exact test were applied to assess associations between categorical clinical variables and FNAC categories. Age was treated

as a continuous variable and summarized as mean $\pm$ standard deviation, while sex was treated as a categorical variable. A p -value < 0.05 was considered statistically significant.

RESULT:

A total of 85 patients with palpable breast lesions were included in this study. The mean age was 44.9 ± 17.5 years (range: 10–90 years). The highest prevalence of breast lesions was observed in the 40–49 years age group (25.9%), while the lowest was in the 10–19 years group (2.4%). Among the 85 cases, 5 (5.9%) were inadequate for cytological evaluation, leaving 80 evaluable cases. Of these, 58 (72.5%) were benign and 22 (27.5%) were malignant. The highest number of malignancies was seen in the 40–49 and 70–79 years age groups, with 6 cases (27.3%) each, while the highest number of benign cases was observed in the 20–29 and 40–49 years groups, with 16 cases (27.6%) each (**Table 1**).

Table 1: Age-wise distribution of breast lesions ($n = 80$ evaluable cases)

Age Group (years)	Total Cases n (%)	Benign n (%)	Malignant n (%)
10–19	2 (2.4)	2 (3.4)	0 (0.0)
20–29	18 (21.2)	16 (27.6)	0 (0.0)
30–39	17 (20.0)	12 (20.7)	3 (13.6)
40–49	22 (25.9)	16 (27.6)	6 (27.3)
50–59	7 (8.2)	4 (6.9)	3 (13.6)
60–69	9 (10.6)	6 (10.3)	2 (9.1)
70–79	7 (8.2)	1 (1.7)	6 (27.3)
80–89	3 (3.5)	1 (1.7)	2 (9.1)
Total	85 (100.0)	58 (100.0)	22 (100.0)

Among the 80 evaluable cases, 72 (90.0%) were female and eight (10.0%) were male. Overall, there were 58 (72.5%) benign and 22 (27.5%) malignant lesions. All male patients had benign lesions, whereas among females, 50 (86.2%) were benign and 22 (100.0%) of all malignant cases occurred in females.

Regarding laterality, out of 85 cases, right-sided lesions were observed in 33 cases (38.8%), left-sided in 49 cases (57.6%), and bilateral involvement in three cases (3.5%), yielding a left-to-right ratio of 1.5:1.

Association of clinical variables with FNAC diagnosis among 80 patients is presented in **Table 2**. Among mobile lesions, 95.5% were benign, and of fixed

Table 2: Association of clinical variables with breast lesion type (n = 80)

Variable	Category	Benign n (%)	Malignant n (%)	Total n(%)	Stats
Consistency	Firm	27 (46.6)	12 (54.5)	39 (48.8)	<0.0001*
	Hard	0 (0.0)	10 (45.5)	10 (12.5)	
	Soft	31 (53.4)	0 (0.0)	31 (38.8)	
Mobility	Fixed	16 (27.6)	20 (90.9)	36 (45.0)	$\chi^2=25.8$, p<0.001
	Mobile	42 (72.4)	2 (9.1)	44 (55.0)	
Tenderness	Non-tender	49 (84.5)	12 (54.5)	61 (76.3)	$\chi^2=7.9$, p=0.005
	Tender	9 (15.5)	10 (45.5)	19 (23.8)	

*Fisher Exact Test

lesions, only 44.4% were benign. The association between mobility/fixity and malignancy was statistically significant. Among benign lesions, the majority were soft and none were hard. Among malignant lesions, the majority were firm, and nearly half were hard, and none were soft. The association between consistency and malignancy was statistically significant. Non-tender lesions were seen in 76.3%, of which most were benign. Among tender lesions, there were more malignant than benign lesions. This association was statistically significant.

Cytological spectrum of breast lesions on FNAC according to the IAC Yokohama System is presented in **Table 3**. Among the 85 total cases, the distribution was as follows: inadequate (C1) – five cases (5.9%); benign (C2) – 52 cases (61.2%); atypical/probably benign (C3) – six cases (7.1%); suspicious of malignancy (C4) – two cases (2.4%); and malignant (C5) – 20 cases (23.5%). Among benign lesions (C2), fibroadenoma was the most common diagnosis, followed by fibrocystic changes, gynecomastia, lipoma, and granulomatous lesions. Among malignant lesions (C5), ductal carcinoma was the predominant subtype, followed by lobular carcinoma and mucinous carcinoma.

DISCUSSION

This study evaluated 85 patients with palpable breast lesions using FNAC and classified them according to the IAC Yokohama System. The findings highlight the demographic and clinical profile of breast diseases in western Nepal and reinforce the utility of FNAC as a first-line diagnostic tool.

The mean age of participants was 44.9 ± 17.5 years, with the highest prevalence of breast lesions observed in the 40–49 years age group (25.9%), followed by the 20–29 years (21.2%) and 30–39 years (20.0%) groups. This age distribution is consistent with studies by Pandia et al.,¹⁰ Khemka

Table 3: Cytological spectrum of breast lesions on FNAC according to the IAC Yokohama System (n = 85)

Yokohama Category	FNAC Diagnosis	n (%)	Total n (%)
Inadequate (C1)	–	5 (5.9)	5 (5.9)
	Abscess	4 (4.7)	
	Fat necrosis	1 (1.2)	
	Fibroadenoma	15 (17.6)	
	Fibrocystic changes	9 (10.6)	
Benign (C2)	Galactocele	2 (2.4)	52 (61.2)
	Granulomatous lesions	6 (7.1)	
	Gynecomastia	7 (8.2)	
	Lactational changes	1 (1.2)	
	Lipoma	7 (8.2)	
Atypical / Probably Benign (C3)	–	6 (7.1)	6 (7.1)
Suspicious of Malignancy (C4)	–	2 (2.4)	2 (2.4)
Malignant (C5)	Ductal carcinoma	15 (17.6)	20 (23.5)
	Lobular carcinoma	4 (4.7)	
	Mucinous carcinoma	1 (1.2)	
Total		85 (100.0)	85 (100.0)

et al.,¹¹ and Prataprao et al.,¹² who also reported a peak incidence in the fourth and fifth decades of life. The predominance of benign lesions in the 20–29 years group (27.6%) aligns with findings from Prataprao et al.¹² and Abad et al.,¹³ reflecting the higher prevalence of fibroadenoma and other benign proliferative conditions in younger women. Conversely, malignant lesions were most frequent in the 40–49 and 70–79 years age groups (27.3% each), which is consistent with the known higher risk of

breast carcinoma in perimenopausal and elderly women.

Among the 80 evaluable cases, females constituted 90.0% ($n = 72$) and males 10.0% ($n = \text{eight}$). All malignant cases occurred in females, while all male cases were benign, with gynaecomastia being the most common diagnosis (7/8 cases), followed by lipoma (one case). This male predominance of benign lesions, particularly gynaecomastia, is concordant with the study by Pathak et al.⁶

Regarding laterality, left-sided lesions were more common (57.6%) than right-sided (38.8%), with a left-to-right ratio of 1.5:1. Bilateral involvement was seen in 3 cases (3.5%). This left-sided predominance is similar to reports by Qadri et al.,² Prataprao et al.,¹² Reddy et al.,¹⁴ and Hussain et al.,¹⁵ although some studies, such as those by Khanam et al.¹ and Mahadani et al.,¹⁶ reported a right-sided predominance. Bilateral involvement has also been documented by Qadri et al.,² Muddegowda et al.,¹⁷ and Singh et al.,¹⁸ suggesting that laterality may vary across populations and is unlikely to have significant clinical or prognostic implications.

A significant association was observed between clinical variables and FNAC diagnosis. Hard consistency was exclusively seen in malignant lesions (10 cases, 12.5%), whereas benign lesions were either firm (46.6%) or soft (53.4%). This is consistent with observations by Rocha et al.¹⁹ and Lamptey et al.²⁰ Similarly, mobile lesions were predominantly benign (95.5%), while fixed lesions were more likely to be malignant (55.6%). This association was highly significant ($p < 0.001$), supporting the clinical axiom that fixity to underlying tissues suggests malignancy. Tenderness was more common in benign lesions overall, but among tender lesions, nearly half (52.6%) were malignant, yielding a significant association ($p = 0.005$). These findings are comparable to those of Pathak et al.⁶ and Umat et al.,²¹ reinforcing the value of thorough clinical examination in triaging patients for further investigation.

Among the 85 cases, the IAC Yokohama distribution was as follows: inadequate (C1) – 5.9%; benign (C2) – 61.2%; atypical/probably benign (C3) – 7.1%; suspicious of malignancy (C4) – 2.4%; and malignant (C5) – 23.5%. The predominance of benign lesions is consistent with studies from other regions. Tambse et al.⁷ in Maharashtra, India, reported 73.3% benign, 11.4% malignant, and 2.4% inadequate among 210 cases. Similarly,

Thapa et al.⁹ in Nepal found 78.9% benign and 11.9% malignant among 109 cases. Marabi et al.²² in the Philippines reported 56.6% benign and 5.6% malignant among 1,080 cases, while Sreevidyalatha et al.⁵ in Karnataka, India, found 46.0% benign and 27.0% malignant. The variation in malignancy rates across studies likely reflects differences in study settings, referral patterns, and patient demographics. The relatively high proportion of benign lesions in our cohort is typical of a general hospital-based population, where patients often present with early, non-malignant breast complaints.

Among benign lesions (C2), fibroadenoma was the most common diagnosis (17.6%), followed by fibrocystic changes (10.6%), gynaecomastia (8.2%), and lipoma (8.2%). This fibroadenoma predominance is consistent with studies by Khanam et al.,¹ Aslam et al.,²³ and Singh et al.,²⁴ although Jayaram et al.²⁵ reported fibrocystic disease as the most common benign lesion in their series, possibly due to differing age distributions and hormonal profiles of the study populations.

Among malignant lesions (C5), ductal carcinoma was the predominant subtype (17.6%), followed by lobular carcinoma (4.7%) and mucinous carcinoma (1.2%). This predominance of ductal carcinoma is consistent with global and regional data, including studies by Singh et al.,¹⁸ Singh K et al.,²³ and Qadri et al.² Inflammatory lesions, including abscess, fat necrosis, granulomatous lesions, and lactational changes, accounted for 14.1% of cases, underscoring the importance of differentiating infective/inflammatory conditions from neoplastic processes in clinical practice.

This study is one of the few from western Nepal to apply the IAC Yokohama System for breast FNAC reporting. The adoption of this standardized system facilitates uniformity in cytological interpretation, reduces inter-observer variability, and improves communication between pathologists and clinicians. Our findings are broadly comparable with international studies, confirming that benign breast diseases remain a significant burden in developing countries, even as malignancy rates continue to rise. The observation that benign lesions outnumber malignant ones in hospital-based studies is consistent with global patterns, although Bdour et al.²⁶ reported a higher carcinoma rate (41.0%), possibly due to a referral bias toward tertiary cancer centers.

This study has several limitations. First, it was conducted at a single center over a one-year period with a relatively small sample size (n

= 85), which may limit the generalizability of our findings to the broader Nepalese population. Second, histopathological examination – the gold standard for definitive diagnosis – was not performed for most cases, precluding cytohistopathological correlation and assessment of FNAC diagnostic accuracy. Third, the retrospective design introduces inherent biases, including incomplete clinical data and lack of standardized follow-up. Future prospective studies with larger sample sizes and histopathological confirmation are recommended to validate our findings and further evaluate the diagnostic performance of the IAC Yokohama System in this setting.

CONCLUSIONS:

In this study, benign breast lesions were more common than malignant lesions, with fibroadenoma being the most frequent benign diagnosis and ductal carcinoma the predominant malignant subtype. The

IAC Yokohama System successfully categorized all 85 cases into five standardized reporting categories. Significant associations were observed between FNAC diagnosis and clinical variables, including consistency, mobility, and tenderness. These findings establish a baseline cytological profile of breast lesions in western Nepal and demonstrate the applicability of the IAC Yokohama System in this setting.

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Conflict of Interest

The authors declare no conflicts of interest.

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