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Cytopathological Analysis of Fine Needle Aspiration of Breast Lumps at a Tertiary Level Hospital in Nepal

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ABSTRACT

Background

Breast lumps constitute a significant proportion of pathological conditions encountered in clinical practice, ranging from benign lesions to malignant neoplasms. Fine-needle aspiration cytology (FNAC) serves as an established method for the cytological assessment of breast lumps. This study is aimed at evaluating cytopathological spectrum of breast lesions utilizing FNAC at a tertiary-level hospital in Nepal.

Methods

A cross-sectional observational study was conducted including 105 patients who underwent FNAC for breast lumps between 1st October 2023 till 30th September 2024 at Bharatpur Hospital. FNAC was performed under aseptic conditions, with aspirated material smeared on glass slides and stained using Papanicolaou and May-Grünwald-Giemsa techniques. Cytological findings were recorded in the departmental register, and relevant demographic data were extracted.

Results

The mean age of participants was 37.6 ± 14.4 years with 89% females and 11% males. Lesions were observed in the left breast in 51.4% of cases, the right breast in 44.8%, and bilaterally in 3.8% of patients. Fibroadenoma was the most common lesion observed in 53.3%, while gynecomastia occurred exclusively in 11.4% males. Malignant and suspicious lesions accounted for 15.2% of cases. Other benign lesions included 6.7% breast abscess, 3.8% galactoceles, 2.9% fibrocystic changes, and rare entities such as granulomatous mastitis, duct ectasia, and lipoma.

Conclusions

The cytopathological spectrum of breast lesions was dominated by benign lesions, with fibroadenoma being the most frequent cytological diagnosis. Malignant lesions accounted for a smaller proportion of cases. These findings enhance the existing evidence on the cytopathological spectrum of breast lesions in Nepal.

Keywords: Breast lump; Cytological evaluation; Fibroadenoma; FNAC; Gynecomastia; Malignancy.

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INTRODUCTION

Breast lumps are among the most common clinical presentations encountered in surgical and outpatient departments particularly among women encompassing a wide range of pathological conditions from benign lesions, such as fibroadenoma and fibrocystic changes, to malignant neoplasms.¹ Accurate and timely evaluation of breast lumps is critical for the early detection of malignant neoplasms, facilitating appropriate treatment and improving patient outcomes and survival. Breast cancer is the most frequently diagnosed cancer among women worldwide and remains a leading cause of cancer-related mortality.² Early detection and prompt diagnosis are therefore critical components of breast cancer control strategies. The diagnostic assessment of breast lumps typically involves a combination of clinical examination, imaging studies, and pathological evaluation.³ Among the available diagnostic modalities, fine-needle aspiration cytology (FNAC) is a valuable tool for the initial evaluation of palpable breast lesions.⁴ FNAC is a simple, rapid, minimally invasive, and cost-effective procedure that provides reliable cytomorphological information for distinguishing benign from malignant breast lesions.⁵ It is associated with minimal patient discomfort, rapid turnaround time, and a low complication rate, making it particularly suitable for routine clinical practice. In resource-limited settings, FNAC offers additional advantages because it requires relatively little infrastructure and can be performed on an outpatient basis, thereby facilitating early diagnosis and timely referral for further management.^{6,7} In resource constrained setting like Nepal, where access to advanced diagnostic procedures may be limited, FNAC plays a pivotal role in evaluating patients presenting with breast lumps. Despite its widespread use in tertiary healthcare institutions, published data describing the cytological spectrum of breast lesions in the Nepalese population remain limited. Understanding the local pattern of breast lesions and their demographic distribution is important for guiding clinical decision-making, resource allocation, and development of evidence-

based diagnostic strategies. The aim of this study is to analyze the cytopathological spectrum of breast lesions diagnosed by FNAC at Bharatpur Hospital, Nepal. Furthermore, this study will describe the demographic characteristics of patients undergoing FNAC for breast lumps to provide evidence regarding utility of FNAC in the evaluation of breast lesions.

METHODS

Study Design

A hospital-based cross-sectional was conducted from 1st October 2023 to 30th September 2024.

Study Area

The study was conducted in the Department of Pathology, Bharatpur Hospital, Chitwan, Nepal.

Study Population

The study population comprised patients presenting with palpable breast lumps who underwent fine-needle aspiration cytology (FNAC) in the Department of Pathology during the study period.

Inclusion and Exclusion Criteria

The inclusion criteria comprised patients with palpable breast lumps who underwent FNAC during the study period and cases with adequate cytological material along with complete demographic and diagnostic records. The exclusion criteria included cases with inadequate or unsatisfactory aspirates for cytological interpretation, cases with incomplete demographic or cytological records, and repeat FNACs from the same lesion during the study period.

Sample Size and Sampling Technique

A census technique was employed, and all eligible cases of palpable breast lumps undergoing FNAC during the study period were included. The final sample consisted of all cases meeting the inclusion criteria.

Data Collection Procedure

FNAC was performed by experienced pathologists under strict aseptic conditions using a 23-gauge needle attached to a 10-mL syringe. The lesion was aspirated through a single puncture, and 3–4 passes were made at different angles and depths while maintaining continuous negative pressure to obtain

adequate cellular material. The aspirated material was smeared onto 4-6 clean glass slides. One smear was immediately fixed in 95% ethanol and stained using the Papanicolaou method, while the remaining smears were air-dried and stained with May-Grünwald-Giemsa stain. Cytological examination was performed by consultant pathologists, and the final diagnoses were recorded in the departmental register. Data regarding age, sex, laterality of the lesion, and cytological diagnosis were extracted from the departmental register using a predesigned data collection proforma. The collected data were checked for completeness and entered into Microsoft Excel for data management.

Study Variables

The independent variables included age, sex, and laterality of the breast lesion. The outcome variable was the cytological diagnosis of the breast lesion. A palpable breast lump was defined as any breast lesion clinically detectable on physical examination and referred for FNAC evaluation. A benign lesion referred to a breast lesion diagnosed as non-malignant on cytological examination. A lesion suspicious for malignancy was characterized by the presence of cytological features highly suggestive of malignancy but insufficient for a definitive diagnosis of malignancy. A malignant lesion was defined as a breast lesion showing cytological features suggestive or diagnostic of malignancy.

Statistical Analysis

Data were analyzed using Stata/BE version 18.0 (Stata Corp LLC, College Station, Texas, USA). Descriptive statistics were used to summarize the study findings. Continuous variables were expressed as mean $\pm$ standard deviation (SD), whereas categorical variables were presented as frequencies and percentages. Results were presented in tables and figures as appropriate.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Committee (IRC) of Bharatpur Hospital, Chitwan, Nepal (Ref. No.: 081/82-059). Patient confidentiality was maintained throughout the study by anonymizing all collected data and restricting access to the dataset to the research team only. No

personal identifiers were included in the analysis or publication of findings.

RESULTS

A total of one hundred and five patients with breast lumps were included in the study. The mean age of the study population was 37.6 years with standard deviation of 14.4 years. Among the participants, the age ranged from a minimum of 12 years to a maximum of 80 years.

Figure 1 illustrates the sex distribution of the study participants, showing that 89% were females, while males comprised 11% of the study cohort.

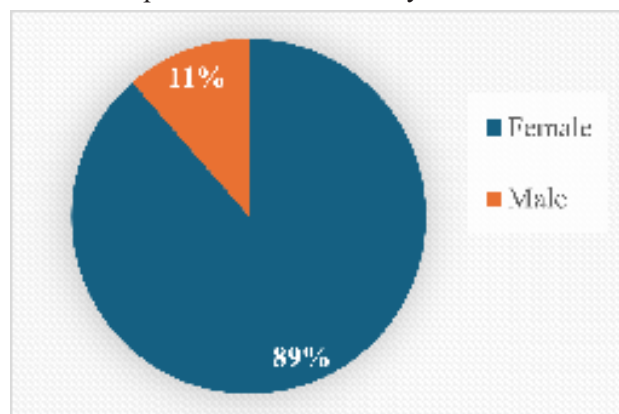


Figure 1. Sex distribution (n=105).

Figure 2 depicts the distribution of breast lump involvement by side, with 51% cases affecting the left breast, 45% cases the right breast, and 4% cases presenting with bilateral involvement. The cytological spectrum of breast lesions summarized

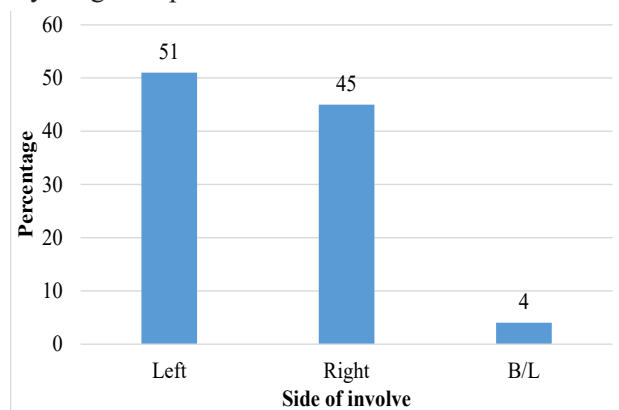


Figure 2. Side of involved breast (n=105).

in Table 1 demonstrates fibroadenoma as the most common diagnosis, accounting for 53.3% of cases. Gynecomastia was the second commonest finding and observed exclusively in male patients, representing 11.4% of the study population.

Malignant lesions accounted for 15.2% of cases, with an equal distribution of confirmed ductal carcinoma and lesions reported as suspicious for malignancy, each representing 7.6% of the cohort. Other benign lesions included breast abscesses, accounting for 6.7% of cases; galactoceles, 3.8%; benign cystic lesions, 2.9%; fibrocystic changes, 2.9%; granulomatous mastitis, 1.9%; duct ectasia, 1.0%; and lipoma, 1.0%. Overall, benign lesions constituted the majority of breast lumps, accounting for 78.1% of cases. Malignant and suspicious lesions together represented 15.2% of the cohort, while inflammatory and other non-neoplastic conditions comprised 6.7% of cases.

Table 1. Distribution of cytological diagnosis of breast lumps (n=105).

Diagnosis	Frequency (%)
Benign Cystic Lesion	3 (2.9)
Breast Abscess	7 (6.7)
Duct ectasia	1 (1.0)
Ductal Carcinoma	8 (7.6)
Fibroadenoma	56 (53.3)
Fibrocystic changes	3 (2.9)
Galactocoele	4 (3.8)
Granulomatous Mastitis	2 (1.9)
Gynecomastia	12 (11.4)
Lipoma	1 (1.0)
Suspicious for malignancy	8 (7.6)

DISCUSSION

The mean age of patients undergoing FNAC was 37.6 years, with an age range of 12 to 80 years, indicating that breast lesions requiring cytological assessment occur across a wide age spectrum. This finding is comparable to the observations of Challa et al., who reported a similar mean age of 37.2 years (range: 16–82 years), suggesting a consistent demographic profile among patients undergoing FNAC.⁸ Comparable results were also reported by Shrestha et al., where the age range was 16–80 years, and the most commonly affected age groups were 31–40 and 41–50 years, reinforcing the predominance of breast lesions in the middle decades of life.⁹ Hassan et al. demonstrated a slightly different age distribution, with the maximum incidence observed among 28% participants during the second decade,

followed by 27% in the fourth decade, indicating a relatively younger peak compared to the present study. Such variations may reflect differences in population characteristics, health-seeking behavior, and referral patterns.¹⁰ In contrast, a large-scale analysis by de Cursi et al. involving 7920 women undergoing FNAC for small breast lesions (≤ 1.0 cm) reported a higher mean age of 49.3 years. The majority of cases in their study occurred in older age groups, with 43% of patients aged 51–80 years and 30% aged 41–50 years, while only 8% were ≤ 30 years.¹¹ This shift toward older age groups may be attributable to the inclusion of very small lesions detected through screening programs, which are more commonly identified in older women. Overall, these comparisons highlight that while FNAC is frequently performed in young and middle-aged women, the age distribution varies according to lesion characteristics, screening practices, and study populations.

The distribution of laterality in this study showed a slight predominance of left breast involvement at 51%, compared with right breast involvement at 45%, while bilateral disease accounted for 4% of cases. These findings are concordant with those reported by Elmadhoun et al., who noted a higher frequency of left-sided lesions in 56.0% cases compared with 40.5% right-sided lesions.¹² In contrast, Saha et al. reported an almost equal distribution between the right and left breasts, with right-sided involvement in 52% of cases and left-sided involvement in 48%.¹³ The variation in laterality observed across different studies indicates that, although a modest left-sided predominance is commonly reported, it is not consistently observed.

Gynecomastia was the second most common cytological finding in this study and was observed exclusively among male patients, accounting for 11.4% of cases. This proportion is higher than that reported by Ibikunle et al., who documented gynecomastia in 4.8% male patients.¹⁴ In contrast, Kamushaga et al., in their study on breast malignancies, reported a much lower proportion of male patients, accounting for only 3.1% of cases.¹⁵ The observed variation across studies may be

explained by differences in study design, case mix, referral patterns, and population characteristics, as well as the inclusion criteria and focus of the respective studies.

Fibroadenoma was the most common cytological diagnosis in this study, accounting for 53.3% of cases. Malignant lesions constituted 15.2% of the total, with equal proportions of confirmed ductal carcinoma and lesions suspicious for malignancy. Other benign lesions included breast abscesses accounting for 6.7% of cases, galactocele comprising 3.8%, and cystic lesions and fibrocystic changes each representing 2.9%. Less frequently encountered diagnoses included granulomatous mastitis, duct ectasia, and lipoma. Overall, benign lesions predominated, comprising 78.1% of all cases. These findings are comparable to those of Riaz et al., who also reported fibroadenoma as the most common lesion in 33.3% cases. However, their study observed higher frequencies of breast abscesses accounting 14.3% of the study population, 12.7% each for cysts, and fibrocystic changes.¹⁶ Moreover, similar to present study Elmadhoun et al. observed predominance of benign conditions accounting for 72% cases, while malignant neoplasms constituted 28% cases, highlighting that benign lesions predominate in FNAC evaluations of breast lumps.¹² However, Saadaat et al. reported breast cancer as the most common diagnosis among Afghan females, accounting for 24% of cases, followed by fibroadenoma and fibrocystic changes, which comprised 22.4% and 15.4% of cases, respectively.¹⁷

Limitations

The study was conducted at a single tertiary-level hospital, which may limit the generalizability of the findings to other healthcare settings and populations. Data were extracted from routinely maintained departmental records and were therefore dependent on the completeness and accuracy of the recorded information, introducing the possibility of information bias. In addition, only patients who underwent fine-needle aspiration cytology (FNAC) for palpable breast lumps at the study center were included, which may limit the representativeness

of the observed cytological spectrum of breast lesions in the broader population. The absence of histopathological correlation for all cases may have further limited the assessment of the diagnostic performance of FNAC.

CONCLUSIONS

In conclusion, this study demonstrated that benign breast lesions constituted the majority of cases with fibroadenoma being the most common cytological diagnosis. Gynecomastia was observed exclusively among male patients, while malignant and suspicious lesions accounted for a smaller proportion of cases. These findings provide insight into the cytopathological spectrum of breast lesions encountered at a tertiary-level hospital in Nepal and contribute to the understanding of the local pattern of breast diseases in patients presenting with breast lumps.

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Conflicts of Interest: The authors declare that they have no conflicts of interest related to this study.

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Availability of data and materials: The datasets generated and analyzed during the study are available from the corresponding author upon reasonable request.

Authors' Contributions

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Supervision: Anita Bhandari, Sharad Sharma.

Writing review & editing: Anita Bhandari, Alina Baral, Sharad Sharma.

Writing-review and editing: Anita Bhandari, Alina Baral, Sharad Sharma.

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