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Cytopathological Spectrum of Breast Lesions: An Observational Study

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ABSTRACT

Background: Breast lesions encompass a broad spectrum of pathological conditions that can significantly affect women health. Cytopathological examination is a rapid minimally invasive method for diagnosing these lesions, differentiating benign from malignant conditions, and informing treatment strategies**. Objectives:** This study aims to analyze the cytopathological patterns and frequencies of various breast lesions to better understand their distribution and prevalence among different age groups. **Method:**A retrospective observational study was conducted, examining breast lesions from female patients at Government Medical College from December 2022 to July 2023. The study analyzed data from registration forms, employing Hematoxylin and Eosin staining on FNAC smears**. Results:** A total of 100 cases were studied, with the age distribution showing a higher prevalence of breast lesions in the 15-19 and 45-49 age groups. Fibroadenoma was the most common benign lesion, comprising 54% of cases, followed by Infiltrating carcinoma at 28%, highlighting a higher occurrence of benign over malignant lesions. The findings emphasize the importance of Age-specific screening and educational programs. **Conclusions:** The study underscores the role of cytopathological evaluation in the accurate diagnosis of breast lesions. The prevalence of benign lesions over malignant ones suggests potential areas for focused healthcare interventions. Understanding these patterns aids in enhancing diagnostic accuracy, improving patient management, and potentially increasing survival rates.

INTRODUCTION

The breast, an intricately structured organ, is essentially a highly specialized form of the apocrine sweat gland. It comprises both epithelial cells, which are involved in producing and secreting substances, and connective tissue, which provides structural and metabolic support. The diseases affecting this organ are multifaceted, ranging from inflammatory conditions to neoplastic changes, which can be either benign (non-cancerous) or malignant (cancerous) [1, 2] .

Globally, breast related diseases constitute a significant portion of the workload in general surgery, highlighting the organs susceptibility to medical issues. It is also one of the most frequently biopsied tissues, indicating the high incidence of lesions that require diagnostic clarification. These lesions, irrespective of their benign or malignant nature, often induce considerable anxiety among patients. Thankfully, the majority of these breast lesions ultimately prove to be benign, providing some reassurance to those affected [3-5] .

Over the years, advancements in medical imaging and the increased application of fine needle aspiration cytology have revolutionized the preoperative assessment of breast lesions. These technologies allow for a quicker and less invasive evaluation, aiding in the decision-making process for potential surgical interventions. Despite these advancements, the definitive differentiation between benign and malignant lesions often still relies on cytopathologicalexaminationa detailed and microscopic study of tissue disease [6-8]

Breast cancer remains one of the predominant neoplasms among females, accounting for significant percentages of all cancer cases10.6% in India and 6.9% worldwide, according to GLOBACAN statistics. Contrastingly, benign breast diseases (BBD) are reported to be more prevalent than their malignant counterparts. Studies suggest that the incidence of BBD ranges from 59.5% to 76.6%, with fibroadenoma being the most common type. On the other hand, malignant breast lesions were found to to constitute

between 23.4% and 40.5% of cases in prior studies.This study aims to delve deeper into the various cytopathological patterns observed in breast diseases and the grading system used to classify these conditions. By understanding the range and characteristics of these lesions, medical professionals can better strategize treatment approaches and potentially improve outcomes for patients [9-11] .

The differentiation between benign and malignant breast diseases is pivotal in the realm of breast pathology. Benign conditions, such as fibrocystic changes, fibroadenomas, and infiltrating papillomas, typically do not spread to other parts of the body and are generally considered to be non-life-threatening. They often require less aggressive treatment and are associated with a favorable prognosis. Malignant conditions, such as invasive ductal carcinoma, invasive lobular carcinoma, and inflammatory breast cancer, however, are characterized by the potential to invade neighboring tissues and metastasize, thereby posing significant health risks and requiring more comprehensive treatment strategies [12, 13] .

Histopathological examination remains the gold standard for diagnosing these conditions. This process involves the microscopic examination of tissue samples, often obtained via biopsy to identify abnormal cellular patterns and structures that signify different types of breast diseases.Pathologists play a crucial role in determining the nature of the lesion benign or malignant and in grading the severity of malignant tumors. The grading system is typically based on the degree of similarity of cancerous cells to normal breast cells and helps in assessing the aggressiveness of the cancer [14, 15] .

However, understanding the cytopathological diversity of breast lesions aids in tailoring individualized treatment plans. For example, certain types of benign breast lesion may respond well to medication and surgical excision, while malignant might require a combination ofsurgery, radiation, and chemotherapy. This personalized approach can significantly impact the effectiveness of the treatment and the patients quality of life during and after treatment [16, 17] .

Study of breast diseases encompasses a wide range of conditions that vary significantly in their prognosis and treatment strategies. The ongoing evolution of diagnostic techniques, particularly in imaging and cytology, has enhanced the ability of health care providers to manage these conditions more effectively. Nonetheless, the critical insights gained from cytopathological examinations continue to underpin the successful diagnosis and management of breast diseases, affirming their importance in the landscape of medical science. Through continued research and technological advancements, the hope is to further refine diagnostic accuracy and treatment efficacy, thereby improving the overall health outcomes for individuals affected by breast diseases [18, 19] .

MATERIAL & METHODS

This was a retrospective study conducted in the Department of Pathology at the GSVM Medical College, Kanpur, U.P., India, spanning from December 2022 to July 2023. It utilized a retrospective approach, gathering data from cytology registration forms, including information on cytological characteristics, age, and gender. The investigation included 100 patients with breast masses, but excluded those with nipple discharge, a history of breast trauma, recurrent cancer, or those undergoing chemotherapy or radiotherapy. Prior to performing fine-needle aspiration cytology (FNAC), info-rmed consent was obtained, followed by a thorough history taking, physical, and clinical examination. FNAC was executed by inserting a needle into the palpable breast mass, using a 20 ml disposable syringe to collect samples. The cellular material aspirated was spread onto glass slides to create 2-4 smears per patient, which were air dried and stained using the Hematoxylin and Eosin staining method. These slides were then examined under a microscope. Some FNAC procedures were also guided by ultrasound. The cytological analysis classified the lesions into inflammatory, benign or malignant [20] . Data analysis was performed using SPSS software to assess statistical significance.

Inclusion criteria: The study included participants based on the following criteria:

1. Cytologically diagnosed cases with a history of breast lumps were included.

2. Female patients across various age groups: pubertal (10–14 years), reproductive (15–49 years), and postmenopausal (50 years and above).

3. Specimens collected through fine needle aspiration and ultrasound guided fine needle aspiration were included in the study.

Exclusion criteria: The study excluded participants under the following conditions:

1. Women previously treated for breast malignancy.
2. Females younger than 10 years.
3. Cases involving male breast lumps.

Ethical Considerations:

The research commenced after obtaining the necessary approval from the institutional ethical committee, ensuring compliance with ethical standards.

RESULTS

The age groups 15-19 and 45-49 show the highest prevalence of breast lesions, with 18% and 16% respectively. This suggests two peak intervals where breast lesions are most frequently observed. Notably, there is a significant presence in the age group 20-24 and 30-34, each constituting 12% of the cases, indicating that younger adults also experience a considerable incidence of breast lesions.The data reflects a sharp decline in the incidence of breast lesions past the age of 60, with only 2% reported in the 60-64 age group and none in the 65-69 age group. This could suggest either a decreased risk or lower detection rates in older

populations, possibly due to different lifestyle or healthcare engagement levels table 1 and figure 1).

The distribution appears to be somewhat bimodal, with peaks in younger (primarily second decade) and middle aged (late fourth decade) populations. This pattern could reflect different types of breast lesions predominant at these ages, possibly benign lesions like fibroadenomas in younger individuals and malignant cases increasing with age. The variance in age group distributions could be statistically analyzed to determine if the observed patterns are significant or if they occur by chance. Statistical tests such as chi-square could be useful for comparing observed frequencies with expected frequencies across different age groups to see if any particular age group is disproportionately affected.

These findings underscore the importance of targeted screening and educational programs for specific age groups especially those in the peak prevalence brackets. Understanding the age distribution can help tailor preventative and diagnostic resources more effectively, potentially leading to better outcomes for patients through earlier detection and treatment of lesions appropriate to their age related risk profile.

Table 1: Distribution by Age Group (5-year)

Age Group	Percentage
10-14	2
15-19	18
20-24	12
25-29	6
30-34	12
35-39	8
40-44	10
45-49	16
50-54	6
55-59	8
60-64	2
65-69	0
Total Percentage (%)	100

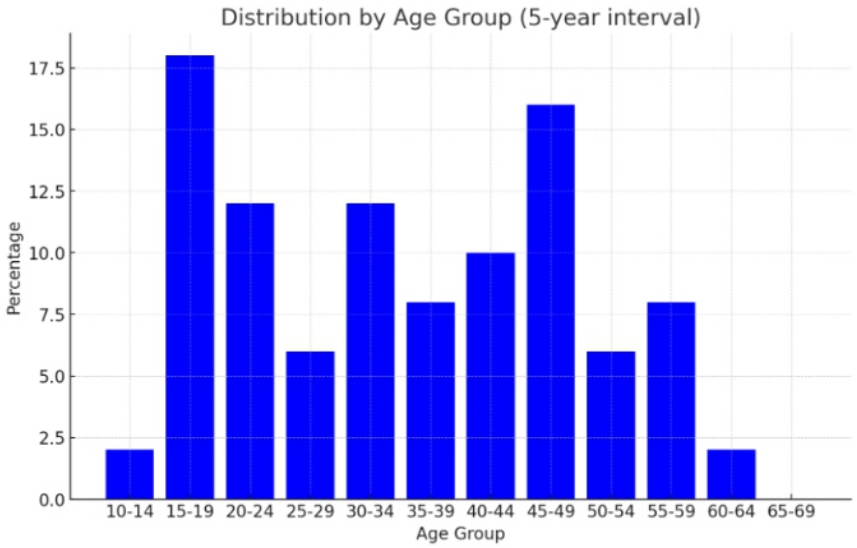

Figure 1: Distribution by Age Group (5-year)

The results from Table 2 and figure 2, in the study provide a comprehensive overview of the diagnosis frequency among the studied breast lesions. A total of 100 cases were considered, with Fibroadenoma being the most prevalent, accounting for 54% of the diagnoses. This high occurrence suggests that Fibroadenoma is the most common benign breast lesion in the study population, reflecting similar patterns seen in younger demographics globally. Following Fibroadenoma, Infiltrating carcinoma represents 28% of the cases, making it the most frequent malignant tumor observed in this sample. This significant percentage indicates a notable prevalence of this type of cancer among the cases examined. Other diagnoses include Fibrocystic disease with 8% , Benign Breast Disease at 4%, and Granulomatous mastitis, Atypical ductal hyperplasia, and Breast abscess each making up 2% of the total. The relatively lower frequencies of these conditions compared to Fibroadenoma and Infiltrating carcinoma suggest a lesser prevalence but still highlight the variety of breast lesions that can occur. The wide range of diagnoses reflects the diverse pathological spectrum of breast diseases, emphasizing the importance of cytopathological examination in accurately diagnosing and categorizing breast lesions.

Table 2: Diagnosis Frequency

Diagnosis	Percentage
Fibroadenoma	54
Infiltrating Curcinoma	28
Fitrocystic Disease	8
Benign Breast Disease	4
Granulomatous mastitis	2
Atypical ductal hyperplasia	2
Breast abscess	2
Total Percentage (%)100	100

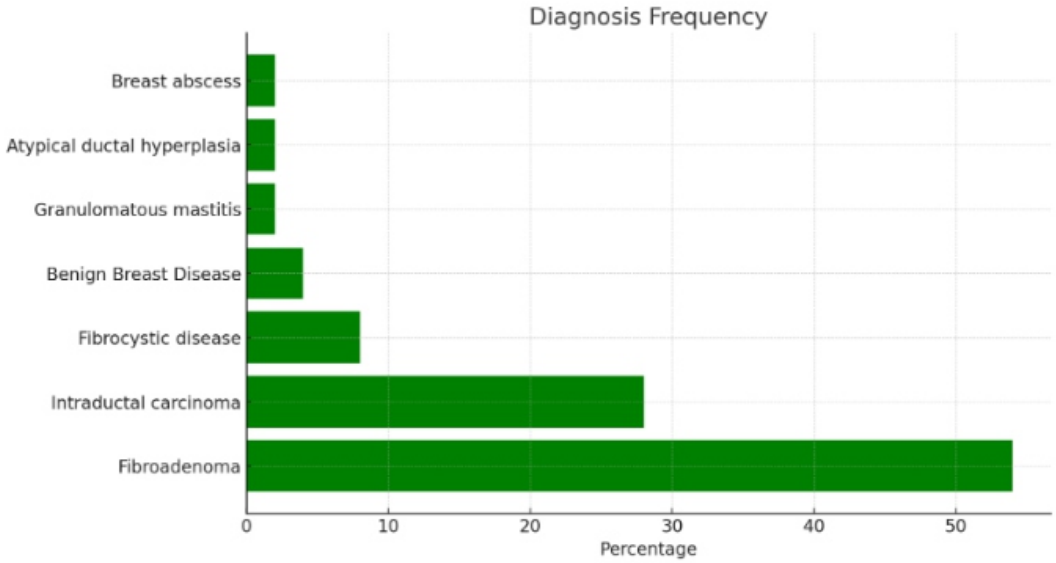

Figure 2 : Frequency of Each Diagnosis Type

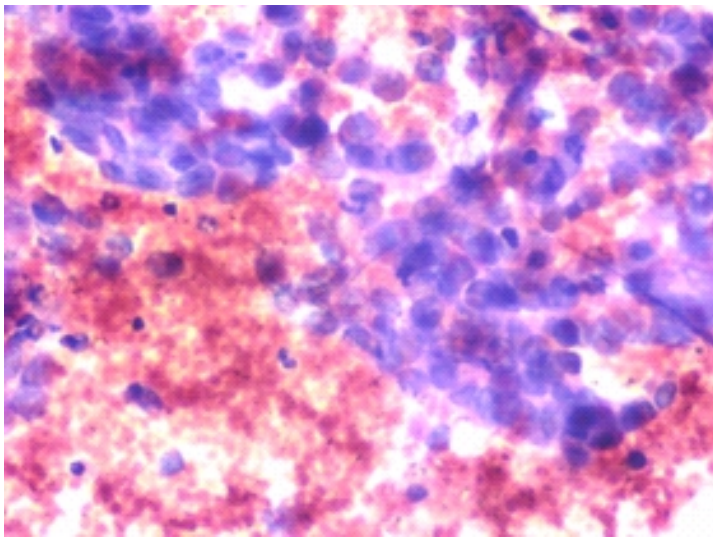

Figure 3: Atypical Ductal Hyperplasia

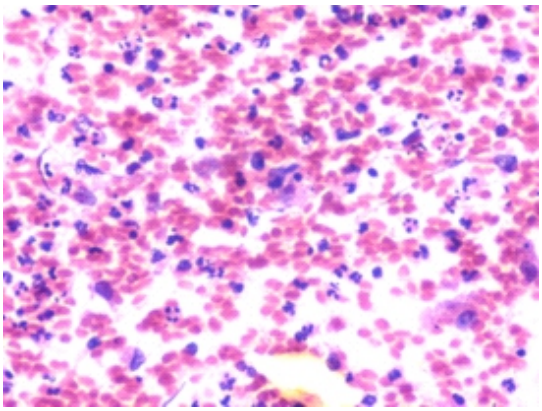

Figure 4: Breast Abscess

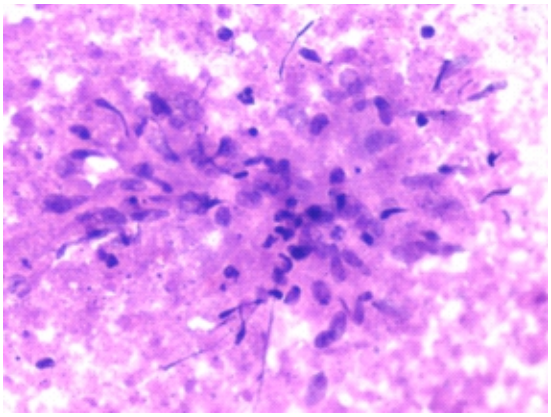

Figure 5: Granulomatous Mastitis

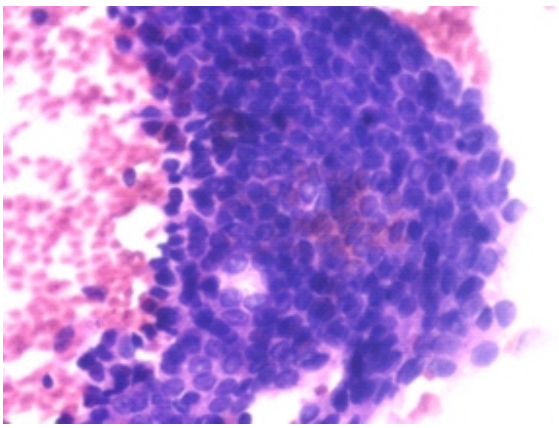

Figure 6: Fibroadenoma

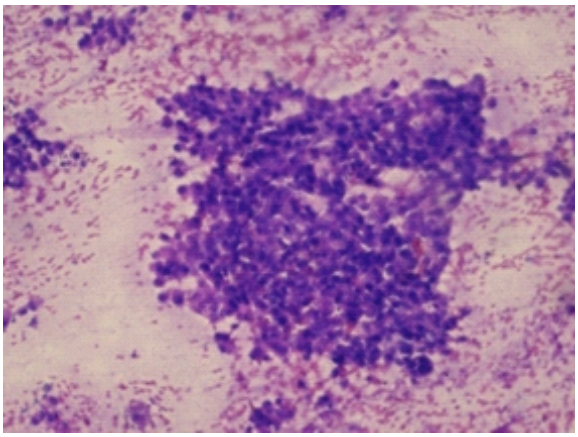

Figure 7: Infiltrating Ductal Carcinoma

The significant distinction between benign and malignant lesions, with benign types such as Fibroadenoma being more prevalent, supports the notion that while breast cancer remains a critical health issue, benign conditions are more commonly diagnosed in certain populations. This data is crucial for understanding the distribution of breast diseases and aids healthcare providers in focusing diagnostic and treatment efforts appropriately based on the most common conditions encountered in clinical practice.

DISCUSSION

The human breast is comprised of specialized epithelial and stromal tissues, both of which can develop into either benign or malignant lesions. Breast lesions occur more frequently in women than in men. The cytopathological characteristics and causes of breast lesions can vary widely across different countries and ethnic groups. Generally, benign breast lesions are more prevalent than malignant ones. Common risk factors for both types of lesions include multiparity, low parity, an earlier age at first childbirth, and late onset of menopause. These factors suggest a potential link to elevated levels of circulating estrogen. This study was undertaken to conduct a detailed cytopathological analysis of breast lesion aspirates, aiming to better understand their nature and underlying causes.

In our research, fibroadenoma emerges as the predominant benign breast lesion, comprising 54% of cases, aligning with findings from studies by Sangeeta et al. and Malik and Bharadwaj. Additionally, fibrocystic disease represents the second most frequent condition, accounting for 21% of cases, which mirrors the results reported by Malik and Bharadwaj. Notably, the incidence of phyllodes tumors in our study is 0%, significantly lower than the 1.2% and 1.7% reported by Malik and Bharadwaj and Sangeeta et al., respectively. Furthermore, granulomatous mastitis and breast abscess are less common, occurring in 2% and 2% of cases, respectively. This distribution highlights the variability in the prevalence of different types of breast lesions and underscores the importance of regional studies in understanding the epidemiology of breast diseases.

In our analysis of malignant breast lesions, infiltrating ductal carcinoma emerges as the most prevalent type, comprising 28% of cases. This prevalence is comparable to the findings of Dauda et al., where it accounts for a significantly higher proportion at 78.8%. These comparisons highlight that while there are variations in the frequency of carcinomas across different studies and populations, malignant breast lesions exhibit relatively consistent prevalence rates globally.

In our study, the majority of malignant breast lesions were most frequently diagnosed in individuals aged between 41 and 50 years, representing 26% of cases. This age related prevalence aligns with the findings previously published study. Additionally, we found that fibroadenoma was the most common breast lesion overall, highlighting its prevalence as a benign condition. Among the malignant types, infiltrating ductal carcinoma was identified as the most

spectrum of breast cancer diagnoses. These findings provide crucial insights into the age distribution and types of breast lesions, aiding in targeted screening and management strategies.

CONCLUSION

We have analyzed 100 cases of breast lesions. Cytomorphological finding shows that benign lesions outnumber malignant ones. Benign tumors appeared most often in the second and third decades, while malignant tumors were primarily observed after the fourth decade. Fibroadenoma was the most prevalent benign tumor, followed by fibrocystic disease. The most common malignant tumor was infiltrating ductal carcinoma. Therefore, cytopathological examination of breast lesions is crucial for their diagnosis, treatment, and prognosis.

CONFLICTS OF INTEREST

Authors declared that there is no conflict of interest.

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All necessary consent & approval was obtained by authors. **CONSENT FOR PUBLICATION**

All necessary consent for publication was obtained by authors.

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