

Original Article

Correlation of Fine Needle Aspiration Cytology (FNAC) with Histopathology of Breast Lesion in a Tertiary Level Hospital

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Shajia Chowdhury^{1*}, Nurul Quayum Mohammad Musallin², Md Abed Hossain³, Suchanda Ray⁴

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*Corresponding Author

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ABSTRACT

Introduction: Fine Needle Aspiration Cytology (FNAC) is a diagnostic procedure used to evaluate lumps or masses in the breast or other parts of the body. It is a minimally invasive technique that involves using a thin, hollow needle to extract a small sample of cells from the suspicious area. FNAC is often employed in the initial assessment of breast lesions to determine whether the lump is benign or malignant. **Objective:** This research article aims to investigate the correlation between Fine Needle Aspiration Cytology (FNAC) and Histopathology findings in patients with breast lesions at a tertiary level hospital. The study intends to evaluate the diagnostic accuracy and reliability of FNAC as a preoperative assessment tool for breast lesions. **Methods & materials:** A retrospective analysis was conducted on a cohort of female patients (N=120) who underwent both FNAC and subsequent histopathological examination of breast lesions at Department of Pathology, Jalalabad Ragib - Rabeya Medical College and Hospital, Sylhet Bangladesh, a tertiary level healthcare facility. The

study period spanned July 2022 to June 2023, and data were collected from patient records, pathology reports, and radiology archives.

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1. Associate Professor, Department of Pathology, Jalalabad Ragib-Rabeya Medical College, Sylhet, Bangladesh
2. Professor, Department of Surgery, Jalalabad Ragib-Rabeya Medical College, Sylhet, Bangladesh
3. Professor, Department of Pathology, Jalalabad Ragib-Rabeya Medical College, Sylhet, Bangladesh
4. Associate Professor, Department of Pathology, Jalalabad Ragib-Rabeya Medical College, Sylhet, Bangladesh

Results: For the diagnosis of benign lesions, the FNA's sensitivity, specificity, positive predictive value, and negative predictive value were determined to be 98%, 96.2%, and 96.5% and 99%, respectively; for malignant lesions, the values were 96.2%, 98%, 99% and 96.5%. In this study, FNAC's diagnosis accuracy was 97.45%. **Conclusion:** For breast lesions, FNAC is a reliable primary screening method with strong specificity, positive predictive value, and high diagnostic accuracy, particularly for malignant tumors.

Keywords: Fine Needle Aspiration Cytology, Histopathology, Breast Lesions, Diagnostic Accuracy, Tertiary Level Hospital.

INTRODUCTION

Martin and Ellis proposed using fine needle aspiration, or FNA, to detect palpable breast masses in 1930 [1]. Establishing a preoperative diagnosis for appropriate oncologic surgical care of cancers and avoiding needless open biopsy or drastic surgery in benign illnesses are the primary goals of a fine-tuning analysis of breast masses. FNA is easy to do, affordable, well-received by most patients, causes the patient little discomfort, and may be done as an outpatient procedure [2]. Breast lesions, encompassing a spectrum of benign and malignant entities, pose a significant health concern worldwide. Early and accurate diagnosis is paramount for appropriate management and improved patient outcomes. In the realm of diagnostic tools, Fine Needle Aspiration Cytology (FNAC) has emerged as a valuable and minimally invasive technique for assessing breast lesions. FNAC provides rapid cytological evaluations, aiding in preliminary diagnosis and guiding subsequent clinical decisions [3]. However, the correlation between FNAC findings and the gold standard of diagnostic confirmation—histopathology—remains a subject of intense scrutiny and research. Histopathology, involving the microscopic examination of tissue sections, provides detailed insights into the cellular

architecture and molecular characteristics of breast lesions, thus offering a definitive diagnosis. Establishing a robust correlation between FNAC and histopathology is pivotal for enhancing diagnostic accuracy, refining treatment strategies, and ultimately improving patient care.

Even though benign breast lesions are frequent, every patient should have an evaluation to rule out or confirm malignancy because more aggressive surgery and adjuvant medication are needed to treat malignancy. One of the leading causes of cancer in women is breast carcinoma [4]. When identifying lesion breast masses, a triple assessment involving a clinical examination, imaging (ultrasound or mammography), and FNAC is the best course of action.

This investigation develops into the intricate relationship between FNAC and histopathology in the context of breast lesions. Through a comprehensive exploration of existing literature, clinical studies, and case analyses, we aim to shed light on the strengths, limitations, and potential pitfalls of FNAC as a diagnostic tool. By evaluating the concordance between FNAC results and subsequent histopathological findings, this study seeks to contribute to the ongoing dialogue surrounding the efficacy and reliability of FNAC in the diagnosis of breast lesions.

METHODS & MATERIALS

A retrospective analysis was performed on a cohort of all female patients at Jalalabad Ragib - Rabeya Medical College and Hospital, Sylhet, Bangladesh, a tertiary level healthcare facility, who received both FNAC and subsequent histological investigation of breast lesions. Data were collected from Department of Pathology, Jalalabad Ragib-Rabeya Medical College, Sylhet, Bangladesh between July 2022 and June 2023. Information was gathered from departmental records, including patient age and gender, the number of outpatients and inpatients, the cytological diagnosis, and the final histological diagnosis. The study excluded patients who did not have a later histological investigation. The study included 120 cases of breast masses that underwent FNAC and were later verified by histology.

Using 5 CC and 10 CC needle and syringe, FNA was carried out following consent acquisition, a comprehensive history, and a clinical evaluation of the mass. Smears were labeled meticulously, fixed with 95% ethyl alcohol and Papanicolaou stain was used to stained these smears. When a fluid aspirate was obtained from cystic swellings, smears were made from sediment and stained after cytocentrifugation. The cytological result was divided into five categories: suspicious, favor malignancy (C4), malignant (C5), atypical, benign (C2), inadequate (C1), and probably benign

(C3). From histopathology registers, the histopathological diagnoses (in trucut biopsy, excision biopsy, and mastectomy) of all cases were done by using Hematoxylin and Eosin stain. Following that, descriptive statistical tabulation and analysis were performed on the data. The Institutional Review Board gave their approval for this project.

RESULTS

Table I: Age distribution of cases (n=120)

Age range	Frequency	Percentage
10-20	9	7.50
21-30	11	9.16
31-40	35	29.17
41-50	42	35.00
51-60	23	19.16
Total	120	100

The age distribution of the cases presented in **Table I** reveals a diverse representation across various age groups. The majority of cases fall within the age range of 31-50 years, comprising 64.17% of the total cohort.

Table II: Cytological diagnosis of cases (n=120)

Cytological diagnosis	Frequency	Percentage
Carcinoma breast	61	50.83
Suspicious of malignancy	3	2.5
Fibroadenoma	25	20.83
Gynecomastia	2	1.67

Benign Phyllodes Tumor	2	1.67
Benign epithelial proliferative disease	10	8.33
Granulomatous mastitis	2	1.67
Breast abscess	2	1.67
Fibrocystic disease	8	6.67
Fibrocystic disease with atypia	2	1.67
Duct papilloma	1	0.83
Inadequate for evaluation	2	1.67

Table II shows the cytological diagnosis of cases. Carcinoma of the breast emerges as the predominant category, constituting 50.83% of cases. This underscores the pivotal role of FNAC in identifying malignancies. Additionally, the diversity

of diagnoses, ranging from benign conditions like Fibroadenoma to suspicious and malignant entities, highlights the spectrum of lesions encountered in clinical practice.

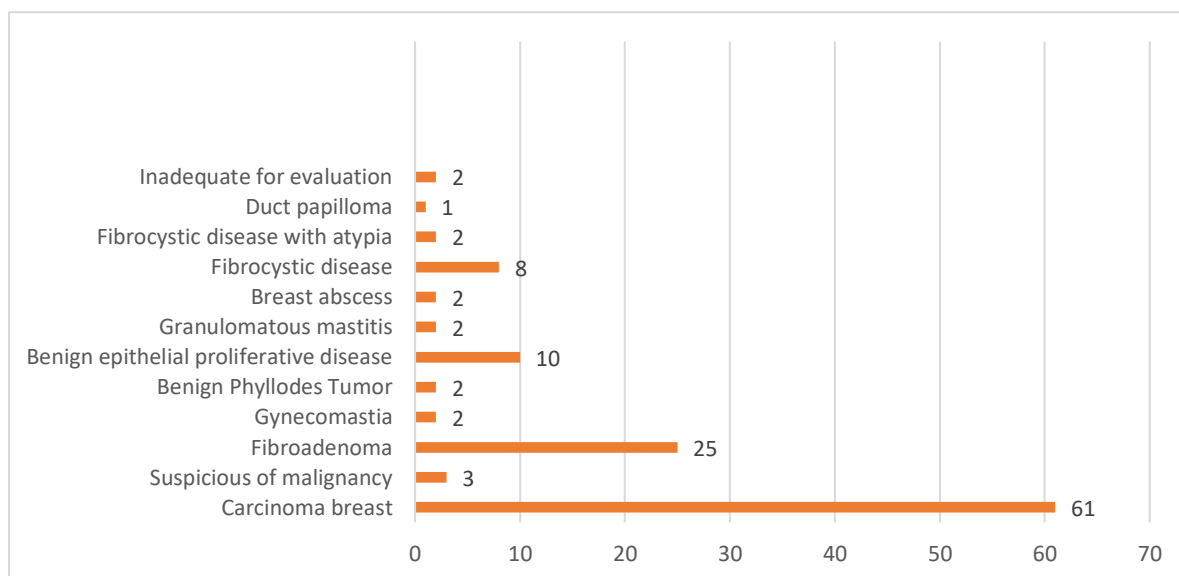


Figure 1: Cytological diagnosis of cases (n=120)

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of diagnoses, ranging from benign conditions like Fibroadenoma to suspicious and malignant entities, highlights the spectrum of lesions encountered in clinical practice.

Table III: Cytohistopathological correlation of cases (n=120)

Category	Cytological diagnosis	Cases	Histopathological diagnosis
C1	Inadequate	1	IDC (1)

C2	Fibroadenoma	18	Fibroadenoma (17) Benign Phyllodes tumor (1)
	Gynaecomastia	2	Gynaecomastia (2)
	Benign Phyllodes tumor	2	Benign Phyllodes tumor (1) Inadequate biopsy (1)
	Benign epithelial proliferative disease	10	Fibroadenoma (3) Fibrocystic disease (3) Benign Phyllodes tumor (2) Complex fibroadenoma (1) Benign breast tissue with no evidence of malignancy (1)
	Breast abscess	2	Breast abscess (2)
	Fibrocystic disease	8	Fibrocystic disease (4) Complex fibroadenoma (2) Fibroadenomatoid hyperplasia (1) Inadequate biopsy (1)
	Granulomatous mastitis	2	Granulomatous lobular mastitis (1) Breast abscess (1)
	Duct papilloma	1	Invasive arcinoma with DCIS (1)
C3	Proliferative disease with atypia	2	Fibroadenosis with focal atypia (1) Fibroadenoma (1)
C4	Suspicious of malignancy	3	IDC (2) Fibrocystic disease with florid epithelial hyperplasia (1)
C5	Malignancy	61	IDC (54) IDC with apocrine differentiation (2) IDC with high grade DCIS (2) Metaplastic carcinoma (1) Medullary carcinoma (1) Mucinous carcinoma (1)

Table III shows the cyto-histopathological correlation of the cases. The correlation spans a range of categories, encompassing concordant diagnoses as well as instances of inadequate evaluations. The detailed breakdown allows for an in-depth understanding of the relationship between cytological and histopathological assessments.

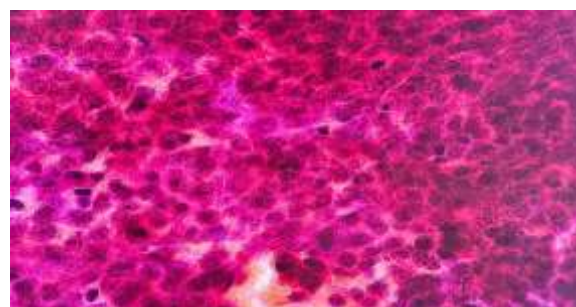


Figure 2: Photomicrograph showing FNAC of Duct cell carcinoma

Figure 2 shows the photomicrograph of FNAC of duct cell carcinoma.

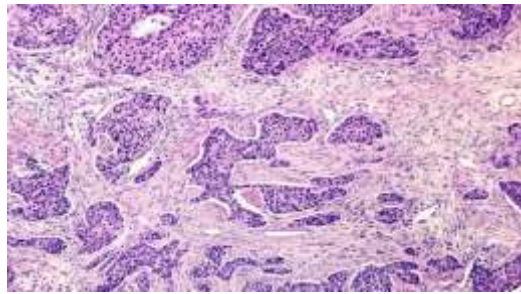


Figure 3: Photomicrograph showing histopathology of Duct cell carcinoma

Figure 3 shows the photomicrograph of histopathology of duct cell carcinoma.

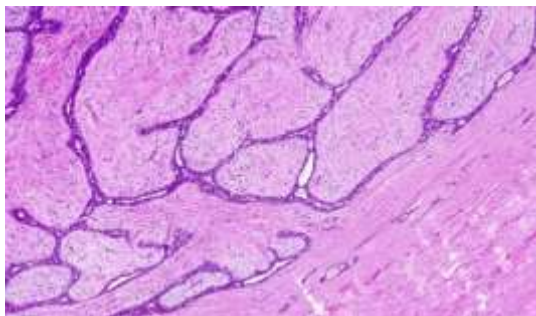


Figure 4: Photomicrograph showing histopathology of Fibroadenoma

Figure 4 shows the photomicrograph of histopathology of Fibroadenoma.

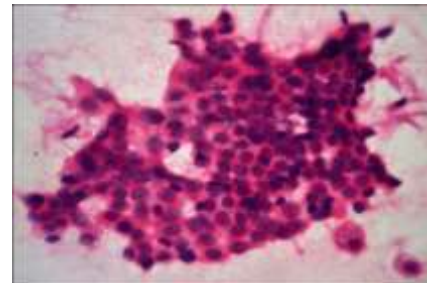


Figure 5: Photomicrograph showing FNAC of Fibrocystic disease

Figure 5 shows the photomicrograph of FNAC of Fibrocystic disease.

Table IV: Accuracy of FNA in differentiating between benign and malignant breast mass

FNA diagnosis	TP	TN	FP	FN	Sensitivity	Specificity	PPV	NPV
Benign	42	73	3	1	98%	96.2%	96.5%	99%
Malignancy/ suspicious of malignancy	73	42	1	3	96.2%	98%	99%	96.5%

TP= True positive, TN= True negative, FP= false positive, FN= false negative, PPV= positive predictive value, NPV= negative predictive value

Table IV shows the accuracy of FNA in differentiating between benign and malignant breast mass. The diagnostic parameters, including sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV), highlight the robustness of FNAC in categorizing lesions. The high sensitivity and specificity values underscore the diagnostic efficacy of

FNAC in both benign and malignant scenarios.

DISCUSSION

Breast cancer ranks as the second most prevalent cancer globally and holds the highest incidence among women, constituting 25% of all cancer diagnoses [5]. In the specific context of Kerala, India, approximately 30% of cancer-affected

women exhibit breast carcinoma [6]. Our study, involving 120 cases, revealed a minimal rate (1.67%) of inadequate sampling, and notably, the predominant diagnosis was malignancy. This aligns with several other studies, possibly influenced by our focus on cases with confirmed histopathology and our institution's status as a tertiary care referral center.

Contrastingly, some studies by Vasavada et al, Rathi M. et al, and Chandanwale SS et al reported a prevalence of benign lesions. Discrepancies may arise from factors like case selection and the tertiary care nature of our institution [7-9]. The highest incidence of breast lumps in our study occurred in the 41-50 age group, differing slightly from Rathi M et al's findings in the 30-39 age group [10]. Notably, cases above 70 years predominantly exhibited malignancy in our study, with the youngest malignancy case being 25 years old. Fibroadenoma emerged as the most common benign lesion, followed by fibrocystic disease, consistent with results from Chandanwale SS et al and Vasavada et al [7,9].

Cytohystological discordance was observed in cases diagnosed as fibroadenoma, possibly due to overlap in cytological features with benign phyllodes tumor or fibroadenomatoid hyperplasia. Complex fibroadenoma and fibroadenomatoid hyperplasia cases were sometimes misdiagnosed as fibrocystic disease on FNA due to various reasons, such as cystic degeneration. Intriguingly, challenges in distinguishing intraductal papilloma from other papillary lesions were highlighted, emphasizing the need for histopathological confirmation [10-13].

In our study, the sensitivity of FNAC was high for both benign (98%) and malignant

(96.2%) lesions. Specificity and positive predictive values for both benign and malignant cases were also notable, resulting in an overall diagnostic accuracy of 98%. Similar findings were reported by various authors, underscoring the reliability of FNAC when performed by experienced cytopathologists. However, it is crucial to acknowledge the impact of technical skills on sampling yield and the potential for errors such as misinterpretation and false negatives.

CONCLUSION

In conclusion, while FNAC proves to be a valuable tool in diagnosing breast lesions, our study highlights the importance of a multidisciplinary approach, incorporating both cytological and histopathological assessments, to ensure accurate diagnosis and guide appropriate clinical management. Our study demonstrates a high sensitivity of FNAC for both benign and malignant lesions, with notable specificity and positive predictive values. The overall diagnostic accuracy of 98% emphasizes the reliability of FNAC, particularly when performed by experienced cytopathologists. Continued research and collaboration in this field are essential for refining diagnostic techniques and improving outcomes for individuals affected by breast cancer.

FUNDING

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CONFLICT OF INTEREST

None declared

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee

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