Gulf Journal of Medical Sciences
*FE Gulf Publishers*
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# An Evaluation of Fine Needle Aspiration Cytology (FNAC) for Diagnostic Purposes

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**Article Info**

**Volume No:** 1 **Issue No: 1** **Page No:** 11-20

**Received:** 15-11-24 **Accepted:** 15-02-25 **Published:** 30-05-25

## Abstract

This study focuses on breast lesions, a significant contributor to illness and death among women. Early diagnosis and treatment are crucial to prevent severe complications. Fine Needle Aspiration Cytology (FNAC) serves as an effective diagnostic method with a high degree of accuracy. The primary aim of this study was to assess the reliability of FNAC in diagnosing palpable breast lumps. Additionally, it aimed to establish a correlation between cytological findings and histopathological analysis of surgically removed tissue samples. A retrospective study approach was adopted, involving FNAC procedures conducted on 180 patients, with 105 cases forming the core study group. The findings revealed that the average age of these 105 patients was 32 years. Among them, 54 had lumps in the left breast, 45 in the right breast, and 4 had bilateral lumps. Cytological examination identified 77 cases as benign, 34 as malignant, and 5 as atypical or suspicious. Histopathological analysis confirmed 77 benign cases, 26 malignant cases, and 1 atypical/suspicious case. The cyto-histological agreement was found to be 93.05% for fibroadenoma and 79.2% for infiltrating ductal carcinoma. The FNAC procedure demonstrated an overall sensitivity of 94.17%, specificity of 100%, and accuracy of 93.26%. Based on these findings, FNAC is confirmed to be a simple yet highly reliable technique for diagnosing both benign and malignant breast lesions, making it an essential tool in breast lump evaluation.

**Keywords:** Cytology, Fine Needle, Women, Cancer.

## INTRODUCTION

Breast lesions are a significant health concern for many women worldwide, with breast carcinoma being the most common type of breast cancer. In recent years, the incidence of breast carcinoma among women has been increasing, creating an urgent need for timely medical intervention (Ferlay, Soerjomataram, Ervik, Dikshit, Eser, & Mathers, 2012). Early

diagnosis and prompt treatment are essential to prevent fatal outcomes. Fine Needle Aspiration Cytology (FNAC) is an effective method for the early detection of breast lesions. This technique is valued for its accuracy, speed, affordability, and minimal risk to patients. It is a simple procedure that can even be performed in outpatient settings. FNAC is a key component of the "triple approach," which includes clinical breast examination, imaging (such as mammography and/or ultrasonography), and cytological assessment. This multidisciplinary strategy is widely used for the preoperative evaluation of breast lesions and aids in determining the most appropriate treatment plan for patients (Ariga, Bloom, Reddy, Kluskens, Francescatti, & Dowlat, 2002; Tabbara, Frost, Stoler, Sneige, & Sidawy, 2000). In the present study, we further explore the role and effectiveness of FNAC in diagnosing breast lesions. Our specific objectives are as follows:

- To evaluate the accuracy of Fine Needle Aspiration Cytology (FNAC) in diagnosing palpable breast lumps.
- To compare cytological findings with histopathological results from surgical biopsy, lumpectomy, or mastectomy specimens.

## MATERIALS AND METHODS

This retrospective study was conducted over a period of two years in the pathology department of a public hospital in Nigeria. A total of 180 female patients who visited the hospital's outpatient department with palpable breast lumps underwent Fine Needle Aspiration Cytology (FNAC). The procedure was performed using a 10 ml disposable syringe and a 24 G disposable needle. The collected smears were wet-fixed in 95% ethyl alcohol and stained with Haematoxylin and Eosin (H&E) stain. Among these patients, 105 underwent additional procedures, including tru-cut biopsy, lumpectomy, or mastectomy. All surgical specimens were processed using routine histotechnical methods and stained with H&E. Only female patients were included in the study. Patients who underwent FNAC without subsequent histopathological examination, those with inadequate biopsy samples, and cases with inconclusive cytology results were excluded from the study.

## RESULTS

We conducted Fine Needle Aspiration Cytology (FNAC) on 180 patients with palpable breast lumps who presented to the outpatient department. Among these, 105 patients (58.33%) subsequently underwent biopsy, mastectomy, or lumpectomy. These 105 cases were selected as the study group for cytohistopathological correlation of various breast lesions. Some patients were lost to follow-up, while others were referred to higher medical centers for further management.

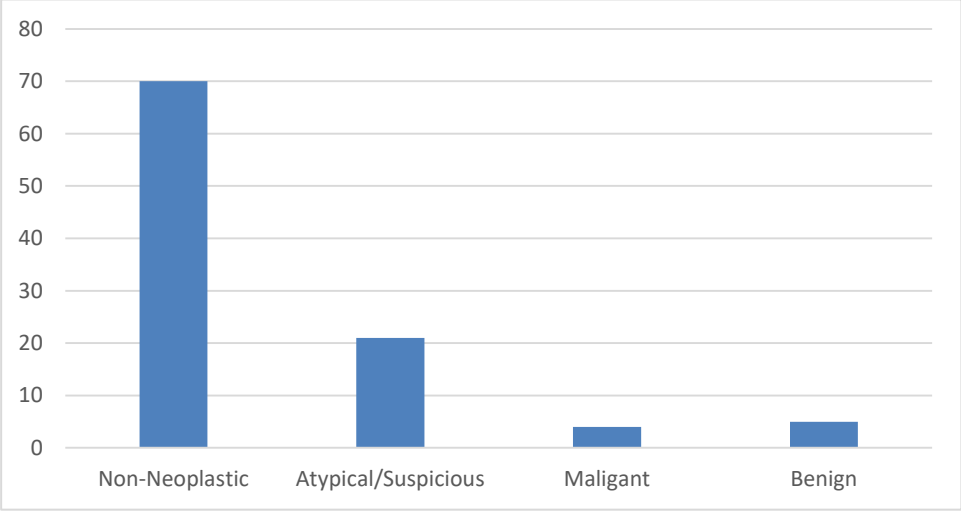


Figure 1:Sector Diagram for Cytology Cases.

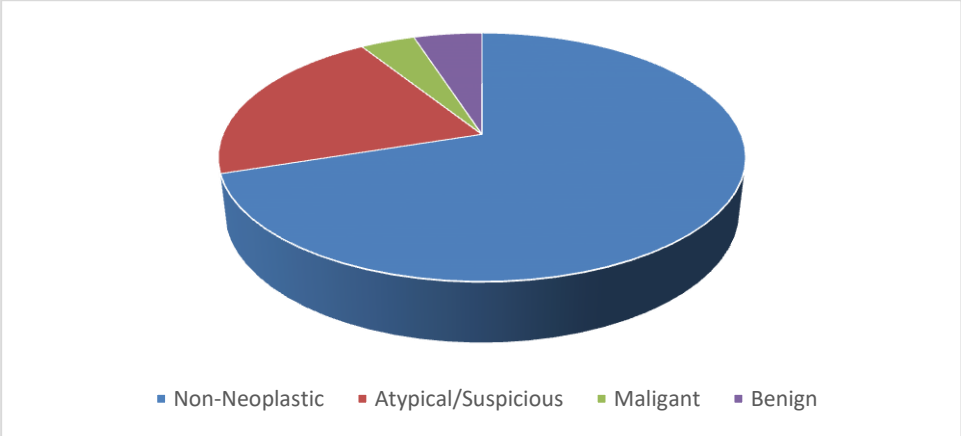


Figure 2: Pie Diagram for Distribution of Histology Cases

The patients' ages ranged from 18 to 68 years, with an average age of 37 years. The youngest patient (18 years) was diagnosed with fibroadenoma, while the oldest patient (68 years old) tested positive for malignancy on cytology. Among the 180 patients, 59 had lumps in the left breast, 69 had lumps in the right breast, and 52 presented with bilateral lumps.

Table 1

*Cytological Diagnosis of Breast Lesions (106 Cases).*

| Category | Diagnosis | Number of cases | Percentage (%) |
|---|---|---|---|
| Benign (Neoplastic and Nonneoplastic) | Fibroadenoma | 73 | 69.52 |
| | Fibrocystic ds. | 2 | |
| | Granulomatous mastitis | 1 | 4.76 |
| | Cyst | 3 | |
| Atypical / Suspicious | | 5 | 4.76 |
| Malignant | | 22 | 20.96 |

The result shows that out of 105 patients, 73 were Fibroadenoma which makes a percentage of 69.52%. Furthermore, 5 more cases were identified out of which 2 were Fibrocystic ds. 1 was Granulomatous mastitis, and 3 were cyst. These 5 cases makes the 4.76% of the total patients we investigated. 5 more patients were atypical or suspisious making a 4.76%. Finally, 22 patients were malignant which was equal to 20.96%.

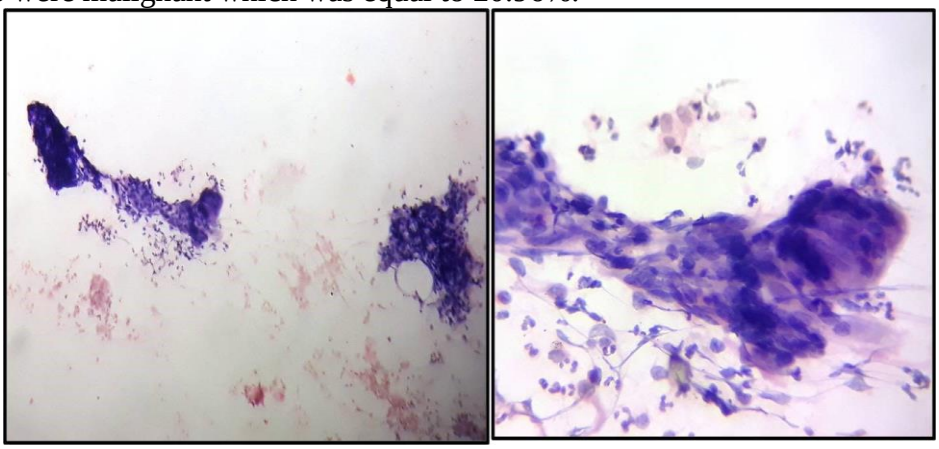

Figure 3a: Granulomatous Mastitis (Cyto: H & E 10X & 40X).

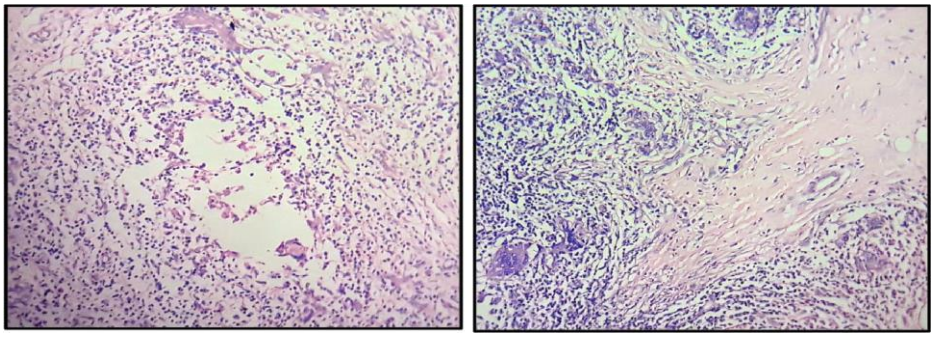

Figure 3b: Granulomatous Mastitis (Histo: H & E 4X &10X).

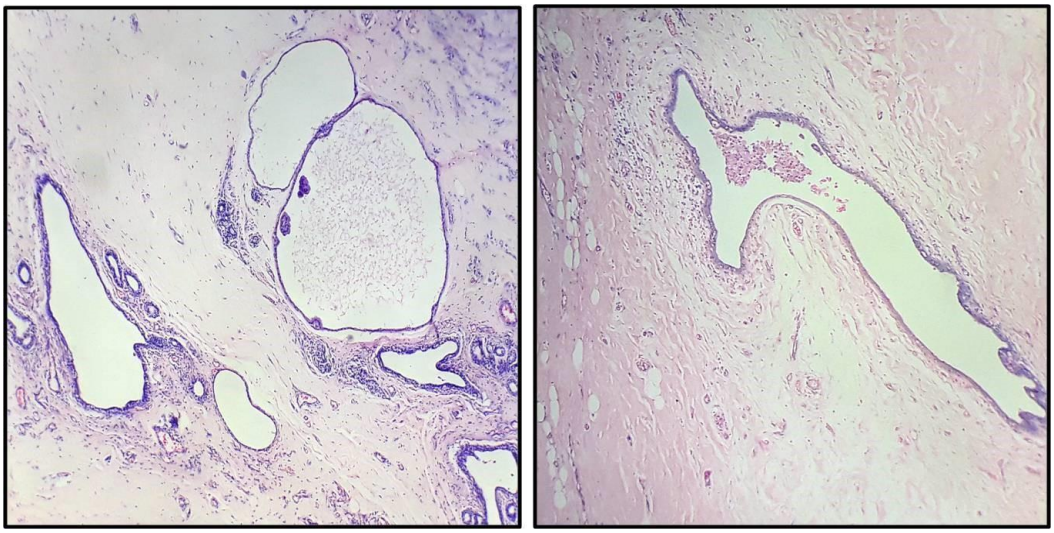

Figure 4: Fibrocystic disease (Histo: H & E 4X &10X).

Table 2

*Histopathological Diagnosis of Breast Lesions (104 cases).*

| Category | Diagnosis | Number of cases | % |
|---|---|---|---|
| Benign | Fibroadenoma | 68 | 64.15 |
| | Phyllodes tumour | 5 | 4.72 |
| (Neoplastic and Nonneoplastic) | Intraductal papilloma | 01 | 0.94 |
| | Fibrocystic ds. | 01 | 0.94 |
| | Granulomatous mastitis | 02 | 1.89 |
| | Duct ectasia | 02 | 1.89 |
| Atypical / Suspicious | Fibroadenoma with atypical ductal hyperplasia | 05 | 4.72 |
| Malignant | Infiltrating ductal carcinoma, Not otherwise specified (IDC, NOS) | 18 | 16.98 |
| | Infiltrating lobular carcinoma | 02 | 1.89 |
| | Mucinous carcinoma | 01 | 0.94 |
| | Mixed IDC & ILC | 01 | 0.94 |

Out of total cases, 68 cases diagnosed as fibroadenoma on cytology, and 4 cases were confirmed through phyllodes tumour. 1 case was identified as intraductal papilloma, 1 as fFibrocystic ds, 2 as Granulomatous mastitis, and 2 as Duct ectasia. 18 cases were identified as infiltrating ductal carcinoma, 2 as infiltrating labour carcinoma, 1 as Mucinous carcinoma, and 1 as Mixed IDC & ILC.

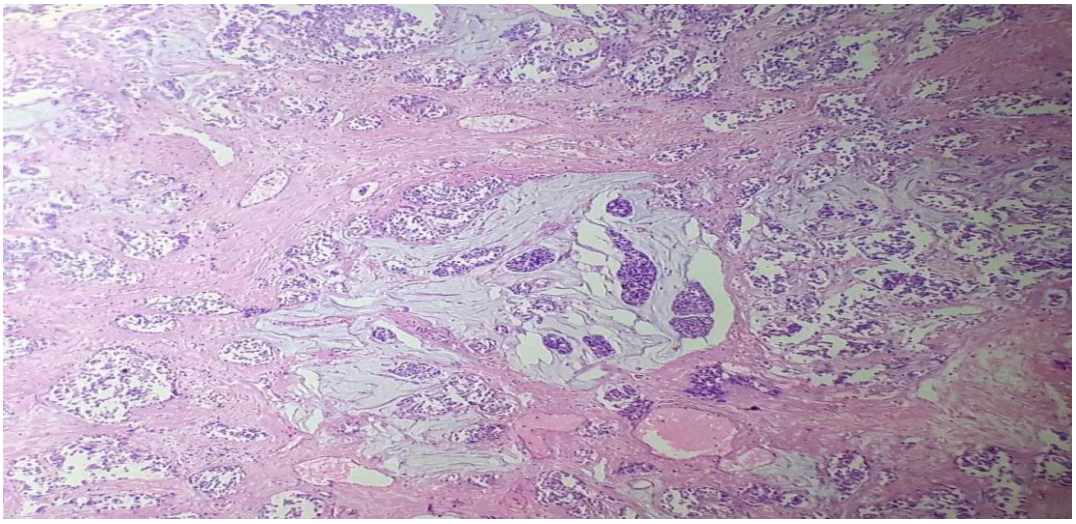

Figure 5: Mucinous Carcinoma (Histo: H & E 4X).

All 22 cases diagnosed as malignant on cytology were confirmed as malignant through histopathology.

**Discussion**

Breast lesions, including breast carcinoma, most commonly present as a clinically palpable breast mass. Fine Needle Aspiration Cytology (FNAC) was first utilized by Martin, Ellis, and Stewart in 1930 for diagnosing palpable breast lesions. Since then, it has remained a valuable diagnostic tool for evaluating breast abnormalities (Bibbo, 1997).

In the present study, Fine Needle Aspiration Cytology (FNAC) was performed on 180 patients with breast lumps, of whom 106 underwent histopathological examination and were included in the study group. Benign lesions were more common in the 2nd to 4th decades of life, while malignant lesions were observed predominantly in the 4th to 7th decades.

In our study, cytological examination of 106 cases revealed that 73 cases (69.52%) were fibroadenoma, 22 cases (20.96%) were malignant, 6 cases were non-neoplastic, and 5 cases (4.76%) were classified as atypical or suspicious lesions. Similar findings were reported by Varsha Pandey, where benign lesions accounted for 70.5%, malignant lesions for 27.9%, and inflammatory lesions for 8.65% (Pandey, Verma, Sudarshan, Chandrakar, & Sharma, 2017; Hussain, 2015; Yalavarthi, Tanikella, Prabhala, & Tallam, 2014). In a study by Khanna, 61.3% of cases were benign and non-neoplastic, while 38.7% were malignant (Khanna, Khanna, Chaturvedi, & Arya, 1998). Our study also shows a higher prevalence of benign lesions, consistent with the findings of both Varsha Pandey and Khanna.

In our study, the most common benign lesion diagnosed on cytology was fibroadenoma, accounting for 68 cases (64.15%). These findings are consistent with those reported by Varsha Pandey (Pandey, Verma, Sudarshan, Chandrakar, & Sharma, 2017) and Pinto (Pinto & Kulwant, 2004), who also identified fibroadenoma as the most frequent breast lesion.

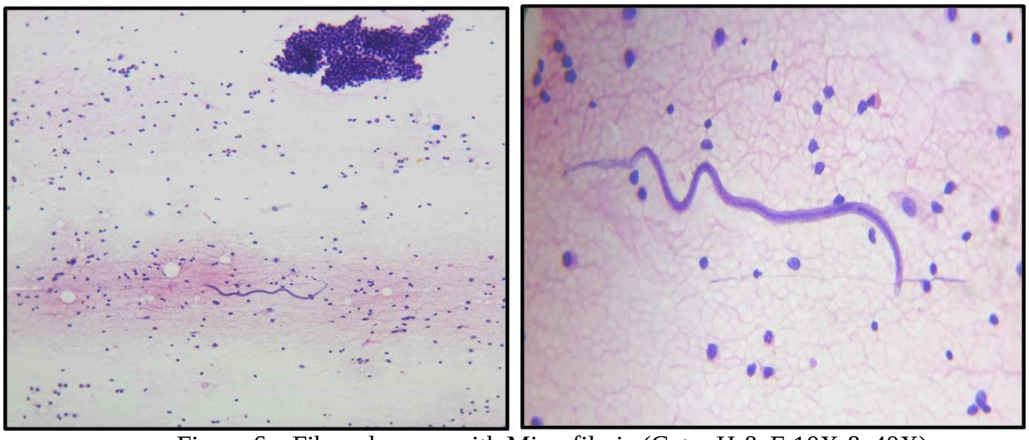

Figure 6a: Fibroadenoma with Microfilaria (Cyto: H & E 10X & 40X).

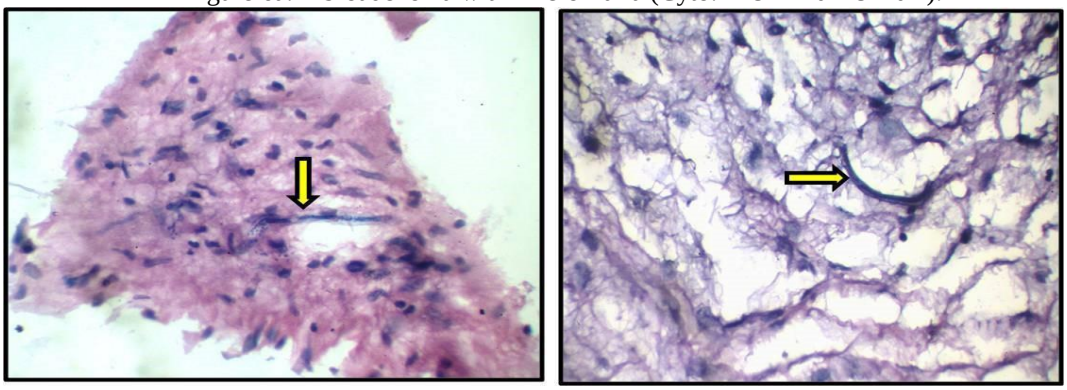

Figure6b: Fibroadenoma with Microfilaria (Histo: H & E 40X).

The patient was a 22-year-old female from a region endemic for filariasis. While mammary filariasis is not uncommon, the coexistence of microfilaria with a benign neoplasm like fibroadenoma is an unusual and extremely rare association (Pantola, Kala, Agarwal, & Khan, 2012). In our case, this was an incidental finding.

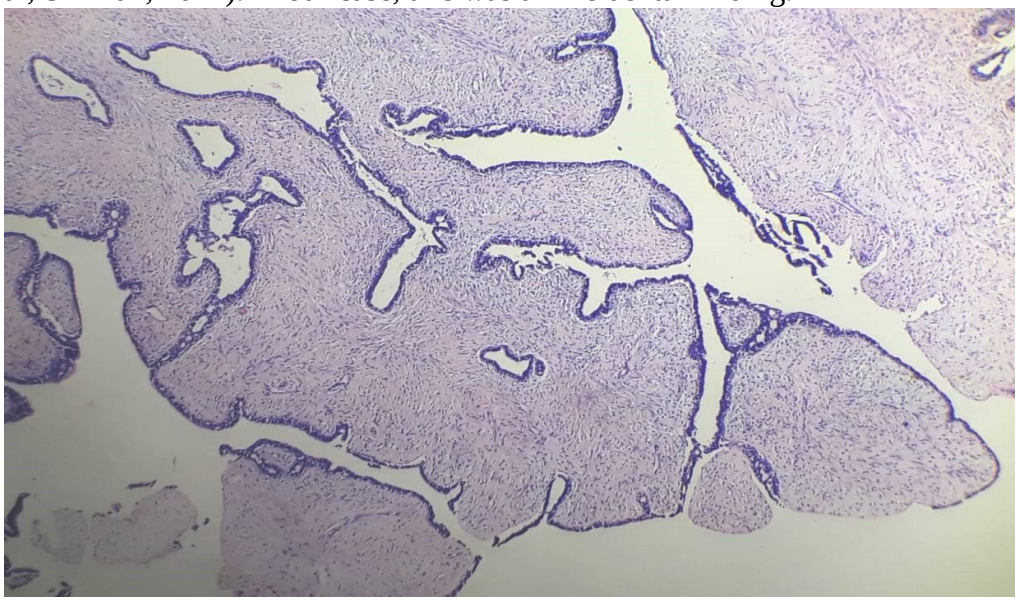

Figure 7: Phyllodes Tumour (Histo: H & E 10X).

Fibroadenoma was confirmed histologically in 68 out of 73 cases. Among the remaining cases, 5 were diagnosed as phyllodes tumor (Figure VII), and 1 case each was identified as intraductal papilloma, 2 cases as Granulomatous mastitis, 2 as duct ectasia.

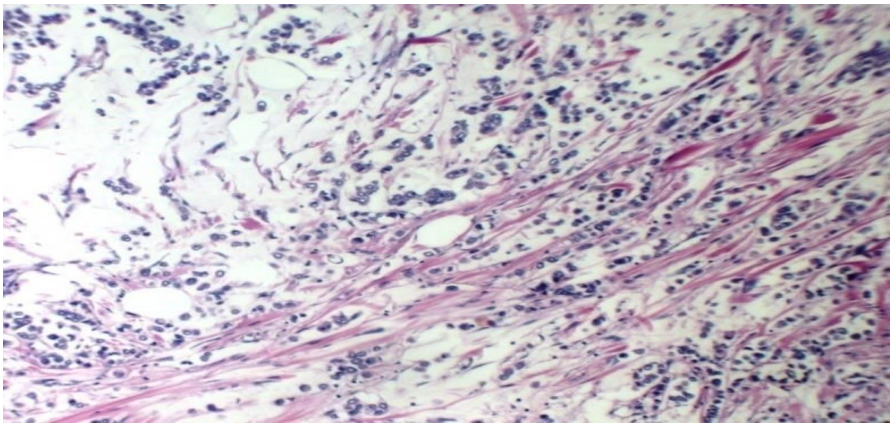

Figure 8a: Invasive Lobular Carcinoma with Extracellular Mucin (Histo: H & E 10X).

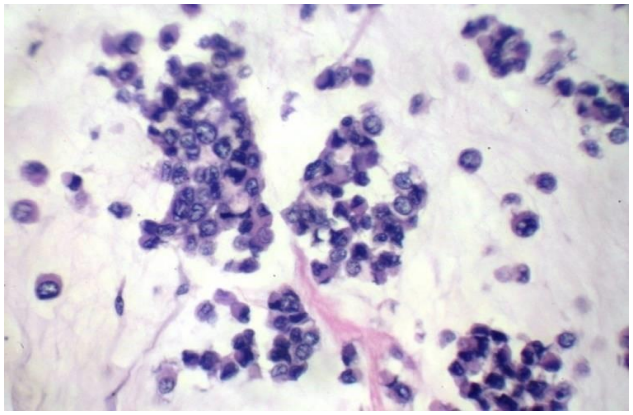

Figure 8b: Invasive Lobular Carcinoma with Extracellular Mucin (Histo: H & E 40 X).

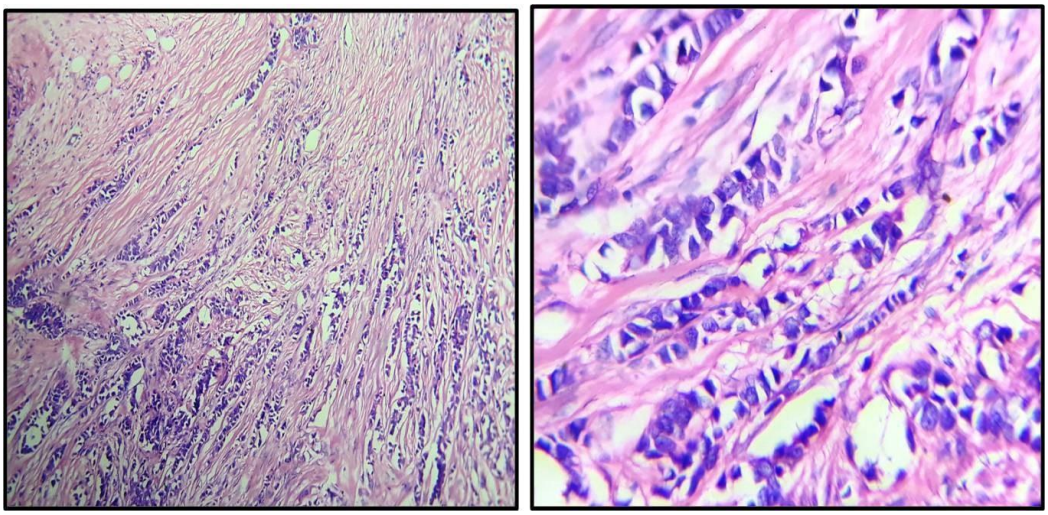

Figure 9: Invasive Lobular Carcinoma -Pleomorphic Variant (Histo: H & E 10X &40X).

In phyllodes tumors, significant epithelial proliferation can occur, and sometimes only the epithelial component is represented in cytology smears. In our two cases, it is likely that these areas were sampled during FNAC, as the smears from both cases showed a predominance of epithelial components. The cytological distinction between fibroadenoma and phyllodes tumor mainly relies on assessing the cellularity of stromal fragments. In both cases, our smears contained only occasional stromal fragments, which represents a diagnostic pitfall in identifying phyllodes tumors (Bibbo, 1997; Orell, Sterrett, & Whitaker, 2005).

Cytology smears from one case initially diagnosed as fibroadenoma were later identified as papilloma on histology. The smears showed cohesive clusters resembling fibroadenoma. However, characteristic features of a benign papillary lesion—such as papillary fronds, singly

scattered columnar cells, macrophages, or apocrine cells—were absent, even upon a detailed review of the slides.

In one case diagnosed as fibroadenoma on cytology, the histological examination revealed duct ectasia. The cytology smears were moderately cellular, displaying numerous monolayered sheets and cohesive clusters of ductal cells along with single bare nuclei. However, foam cells or inflammatory cells were not observed. Typically, cytology smears of duct ectasia are paucicellular. Our findings did not align with the usual cytological features of duct ectasia.

One case diagnosed as fibroadenoma on cytology was found to have ductal hyperplasia with nuclear atypia on histopathology, which was not represented in the cytology smears. It is likely that the needle did not sample the hyperplastic ducts. This patient was advised to undergo close follow-up. Cyto-histological concurrence was observed in 66 out of 73 fibroadenoma cases (90.41%). In a study by Pinto et al., the cyto-histological correlation for fibroadenoma was reported to be 89.7%.

According to the literature, fibrocystic disease, papilloma, and phyllodes tumor are considered "grey zone" breast lesions that are difficult to classify accurately on FNAC (Mitra & Dey, 2015). This represents a known limitation of the FNAC technique. In another case, where the histological diagnosis was duct ectasia, aspiration yielded a yellowish-white fluid. Cytology smears revealed eosinophilic proteinaceous material, occasional clusters of benign ductal cells, and a few cyst macrophages, leading to a diagnosis of a cystic lesion. In our study, 2 cases each of granulomatous mastitis and fibrocystic disease were confirmed through histopathology. The sensitivity and specificity of FNAC in diagnosing benign lesions were 92.2% and 100%, respectively. These findings are comparable to the studies by Manju Vala (Vala, Goswami, & Suri, 2014) and O'Neil (O'Neil, Castelli, Gattuso, Kluskens, Madsen, & Aranha, 1997), who reported sensitivities of 92% and 92.17% for benign lesions, respectively.

In our study, 3 cases were diagnosed as atypical/suspicious lesions on cytology. Due to the presence of nuclear atypia, biopsy was recommended for all cases to rule out or confirm malignancy. Histological examination revealed benign fibroadenoma in one case. In the remaining two cases, biopsy and subsequent excision confirmed infiltrating ductal carcinoma and mucinous carcinoma, both of which were of low-grade histology. We conclude that all hypercellular smears with nuclear atypia, even if they fall short of a definitive diagnosis of malignancy, should be followed up with a biopsy. This approach is essential to confirm or exclude malignancy and to facilitate appropriate and timely management.

In our study, 22 cases were reported as positive for malignancy on cytology, and all were confirmed as malignant on histopathology. This indicates that FNAC had a sensitivity of 100% in diagnosing malignant breast lesions. Similar findings have been reported by Manju Vala (Vala, Goswami, & Suri, 2014), Zhang Qin (Zhang, 2015), and Tiwari (Tiwari, 2007), who also observed 100% sensitivity for the diagnosis of malignant breast lesions in their respective studies.

The most common malignant lesion identified on histopathology was infiltrating ductal carcinoma, not otherwise specified (IDC, NOS), accounting for 18 cases. This was followed by infiltrating lobular carcinoma (ILC) in 2 cases, and 1 case each of mucinous carcinoma and mixed IDC & ILC. Additionally, 2 cases of IDC, NOS also exhibited a ductal carcinoma in situ (DCIS) component.

## CONCLUSION

Our study confirms that FNAC is a reliable method for diagnosing both benign and malignant breast lesions, demonstrating a high level of correlation with histopathological findings. It serves as an effective tool for preoperative decision-making, helping to guide patient management and avoid unnecessary surgical interventions. In cases where the cytological diagnosis is inconclusive, combining FNAC with clinical examination, ultrasonography,

and/or mammography can enhance diagnostic accuracy and aid in planning surgical biopsy. Overall, we conclude that FNAC is a dependable and routine preliminary diagnostic procedure for the evaluation of breast lesions.

**References**


Ariga, R., Bloom, K., Reddy, V.B., Kluskens, L., Francescatti, D., Dowlat, K. (2002). Fine-needle aspiration of clinically suspicious palpable breast masses with histopathologic correlation. *American Journal of Surgery, 184*, 410-3.

Bibbo, M. (1997). *Comprehensive Cytopathology* (2nd ed.). Philadelphia: W.B. Saunders Company.

Chaudhary, S., Bano, S., & Chaudhary, S. (2008). Correlation of fine needle aspiration cytology with histopathology in palpable breast lesions: A five-year review. *Indian Journal of Pathology and Microbiology, 51*(4), 505–509. https://doi.org/10.4103/0377-4929.43838

Ferlay, J., Soerjomataram, I., Ervik, M., Dikshit, R., Eser, S., Mathers, C. (2012). *Cancer Incidence and Mortality Worldwide: IARC Cancer Base No. 11*. Lyon, France: International Agency for Research on Cancer. Available from: http://globocan.iarc.fr

Hussain, M.T. (2015). Comparison of fine needle aspiration cytology with excision biopsy of breast lump. *Journal of College of Physicians & Surgeons Pakistan, 15*, 211-4.

Khanna, R., Khanna, S., Chaturvedi, S., Arya, N.C. (1998). Spectrum of breast disease in young females; a retrospective study of 1315 patients. *Indian Journal of Patholgy Microbiology, 41*(4), 397-401.

Kumar, R., & Awasthi, S. (2014). Utility of fine needle aspiration cytology in the evaluation of breast lesions: A retrospective study of 222 cases. *Journal of Cytology, 31*(4), 217–222. https://doi.org/10.4103/0970-9371.151147

Mehra, K., Kumar, V., Kaur, R., Gupta, N. (2016). Cyto-histopathological correlation in palpable breast lesions. *International Journal of Research in Medical Science, 4*(6), 194-194.

Mitra, S., Dey, P. (2015). Grey zone lesions of breast: Potential areas of error in cytology. *Journal of Cytology, 32*, 145-152.

O'Neil, S., Castelli, M., Gattuso, P., Kluskens, L., Madsen, K., Aranha. G. (1997). Fine-needle aspiration of 697 palpable breast lesions with histopathologic correlation. *Surgery, 122(*4), 824-828.

Orell, S.R., Sterrett, G.F., Whitaker, D. (2005). *Fine Needle Aspiration Cytology* (4th ed.). New Delhi: Elsevier Publication.

Pandey, V., Verma, N.K, Sudarshan V, Chandrakar, K.S., Sharma, A. (2017). Cyto-histopathological correlation of breast lesions - A rural hospital based study. *Indian Journal of Pathology and Oncology, 4*(1),117-121.

Pantola, C., Kala, S., Agarwal, A., Khan, L. (2012). Microfilaria in cytological smears at rare sites coexisting with unusual pathology: A series of seven cases. *Trop Parasitol, 2*, 61-63.

Pereira, F. G., da Silva, I. T., & dos Santos Thuler, L. C. (2020). Fine-needle aspiration cytology (FNAC) is a reliable diagnostic tool for small breast lesions (≤1.0 cm): A 20-year retrospective study. *Surgical and Experimental Pathology, 3*(1), 1–7. https://doi.org/10.1186/s42047-020-00081-0

Pinto, R.G., & Kulwant, S. (2004). A statistical analysis of fine needle aspiration biopsies in palpable benign (neoplastic and non-neoplastic) breast lesions. *Journal of Cytology, 21*, 64-7.

Tabbara, S.O., Frost, A.R., Stoler, M.H., Sneige. N., & Sidawy, M.K. (2000). Changing trends in breast fine needle aspiration: Results of the Papanicolaou Society of Cytopathology Survey. *Diagn Cytopathol*, *22*, 126-30.

Tiwari, M. (2007). Role of FNAC in diagnosis of breast lumps. *Kathmandu University Medical Journal*, 5, 21 5-217.

Vala, M.T., Goswami A, Suri SK. Comparative study of cytological and histopathological finding in breast lesion. *IOSR Journal of Dental and Medical Sciences. 2014, 13*(7), 05-07.

Yalavarthi, S., Tanikella, R., Prabhala, S., Tallam, U.S. (2014). Histopathological and cytological correlation of tumors of breast. *Med J DY Patil Univ,7*, 326-331.

Zhang, Q., Shigui, N., Yuhua, C., Limei, Z. (2004). Fine needle aspiration cytology of Breast Lesions: Analysis of 323 cases. *The Chinese-German Journal of Clinical Oncology, 3*(3),172-174.