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Histological Correlation Of All Palpable Breast Lumps Using Fine Needle Aspiration Cytology

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ABSTRACT

Breast is a dynamic structure that changes throughout the reproductive life and menstruation cycles. Breast lumps are a common issue among females, and various diseases are prevalent in both developed and developing countries. A prospective study of cytology and histopathology was conducted in the Central lab and the Department of Pathology, involving 100 cases from January 2020-December 2022. The majority of the patients were between 21-40 years old and presented with a mass in the breast, with most in the left breast. FNAC was classified into C1-C5 categories, with 76 cases being benign. The C5 category included 15 cases of duct carcinoma-NOS type, 2 cases of mucinous carcinoma, and a case each of lobular carcinoma and malignant phyllodes. FNAC was found to be 90% sensitive, 98.75% specific, and 97% accurate in the diagnosis of malignant lesions, with a false negative percentage of 10%. This study suggests that FNAC is an effective and valid tool for preoperative diagnosis of both benign and malignant lesions. When combined with physical examination, mammography, and FNAC, the results show high sensitivity, specificity, positive and negative predictive value, leading to reliable early breast cancer diagnosis.

Key words: FNAC; Histopathology; Breast Lumps, NCI Categorization; Mammography

I.INTRODUCTION

Developed and underdeveloped nations both have a disproportionately high number of breast illnesses. While relying just on clinical symptoms for diagnosis might be misleading, a combination of FNAC and mammography (if applicable) can assist differentiate between benign and malignant tumors before deciding on a course of treatment. In addition, it will rule out the need for a core biopsy of the lesions before treatment.

When it comes to diagnosing different breast lesions, FNAC is the first line of defense since it is less costly, more sensitive, specific, easy, and safe. Histopathological results of surgically excised lesions may aid in FNAC correlation after the surgery. The National Cancer Institute (NCI) has established five categories for the FNAC of breast tumors, numbered C1 through C5.2

C1- Inadequate C2- Benign

C3- Atypia probably benign C4- Suspicious of malignancy C5- Malignant.

Clinical examination, FNAC, and mammography, also referred to as the "triple method," may classify almost all breast lesions as benign or malignant prior to surgery. Hermansen et al. (1987) and Kreuzer and Boquoi (1976) proposed this method. The last quarter of a century has seen the widespread usage of 3 FNAC in the detection of breast lesions. Tissue core needle biopsy has recently supplanted FNAC as the gold standard for diagnosing breast cancer in both palpable and nonpalpable tumors. This could be because treating clinicians who choose to employ chemotherapy as a primary treatment option for breast cancers are able to use tissue core biopsy results to more quickly grade tumors and determine ER and PR receptor status than they would with a FNAC. The inability to distinguish between in situ and invasive carcinoma is a major drawback of FNACs.

To diagnose a breast anomaly prior to, and sometimes without the need for, invasive surgical biopsy is the primary goal of core needle biopsy. To this day, when FNAC still can't make a diagnosis, investigators will still turn to it as a supplementary technique.5 Even with core needle biopsy (CNB), certain lesions still aren't easy to diagnose, thus doctors may recommend removing the lump. Atypical proliferative lesions, such as lobular neoplasm, fibroepithelial atypia, phyllodes tumors, papillary lesions, mucinous lesions, radial scar, and spindle cell lesions are among them.5 The general accuracy, lack of invasiveness, repeatability, and timeliness of findings from FNAC, however, mean that it continues to be the most common diagnostic modality.

Reports indicate that FNAC has an overall accuracy of around 97.40% when it comes to diagnosing breast lesions. If FNAC comes out positive for breast lesions, the diagnostic sensitivity is 93.80%, the specificity is 98.21%, and the predictive value is 92.70%.

Results reveal a sensitivity of 94.5 percent, specificity of 98.5 percent, diagnostic accuracy of 97.0 percent, positive predictive value of 95.6 percent, and negative predictive value of 97.3 percent when it comes to cases of cancer.3. There was a 1.3% false positive rate and a 1.8% false negative rate in this research. There is a 4% false negative rate even in frozen section biopsies, while the literature reports false negative rates between 7.5% to 21.9% at order to determine the accuracy rates, this research would do FNAC on palpable breast lesions at a tertiary care hospital.

Aim and Objectives

1. Examining the FNAC results of different breast lesions and highlighting their significance for decision makers prior to care is the goal of this research.
2. Breast cancer screening results classified by the National Cancer Institute (NCI) in 1996, from C1 to C5.
3. When doing surgical excision, it is important to correlate all FNAC results of the lesions with histological analysis. As well as mammographic correlation, if that becomes required.

II.REVIEW OF LITERATURE

Literature history:

Workshops and continuing medical education (CME) programs for pathologists, surgeons, doctors, and radiologists helped disseminate FNAC from its original introduction in India in the early 1970s to other regions via the country's postgraduate pathology curriculum.7. All hospitals, private clinics, and labs now practice FNAC. Every center utilized disposable syringes and needles. The use of syringe holders decreased with time. We utilized two or more common stains. They used one or more supplementary methods for aspirate.

Literature survey:

Research supports the use of fine needle aspiration for the evaluation of all breast lesions, whether palpable or not, that are visible on mammography. The findings are consistently positive. The research conducted by Yalavarthi S. et al. in 2014 reached the following conclusion: FNAC is the optimum first diagnostic modality for breast masses since it is painless for the patient, does not need anesthesia, and produces findings quickly without producing false positives. It is challenging to subcategorize the lesions cytologically without clinical and mammographic information, nevertheless. Acquiring technical, observational, and interpretive abilities in accordance with the Triple test approach will further improve the diagnosis accuracy of breast lesions.

Dr. Kujur P. and colleagues found in 2015 that FNA may replace biopsy in certain cases, both for diagnosis and for treatment planning.

According to research by Dr. Sangita Singh and colleagues in 2015, histology confirmed the malignant nature of all FNAC cases. Of the fifty cases examined, histopathology and FNAC results were compatible in forty-eight instances. Although histopathology and FNAC did not always agree, in one case it revealed atypical hyperplasia and in the other it revealed just inflammatory cells and decaying debris. There was a 96% sensitivity rate and a 100% specificity rate for FNAC in breast lumps. 21 The results of this investigation revealed a strong association.

There is a strong correlation between histological diagnosis and FNAC reporting according to NCI criteria, according to a 2017 research by Arul P Masilamani S.

A 2018 research by Drs. Zeenat, Rameez, and S.S. More found that a combination of a physical exam, mammography, and FNAC may accurately detect breast masses. When it comes to managing breast lesions before surgery, FNAC is a must-have. Factors contributing to its popularity include its accuracy, convenience of use, and cost. Image technology advancements and clinician skill both had a role in making it more sensitive.

A 2018 research by Goyal S et al. shown that FNAC is a good first line of defense for diagnosing breast masses. Clinicians may use the procedure's relatively precise data to choose the best course of therapy, and it's also quite safe. A strong negative predictive value for malignancy and excellent specificity show that FNAC is quite accurate in diagnosing breast cancer. An internal quality control criterion might therefore be the cytohistopathological correlation.

Fine needle aspiration cytology was determined to be a fast, cheap, safe, and widely accepted method in a 2018 research by Dr. Vasundara Gardas. Even while cytology can't always provide a certain diagnosis, it can classify the samples and propose potential differential diagnoses that might lead to further fruitful investigations. But histology is still necessary, and aspiration cytology won't do the trick. A 2019 research by Dr. K Vani found that FNAC is a crucial first step in diagnosing palpable breast masses, and that when performed by trained professionals, the results correlate well with the final histology report. Mandal A et al. found in 2020 that a rise in the cancer detection rate was associated with the extensive use of ultrasonography as an adjuvant to mammography. While FNAC may be useful for evaluating benign breast lumps, core needle biopsy has shown to be more accurate. Additionally, this research demonstrated the critical need of preoperatively classifying breast abnormalities for patient care, which will aid in avoiding unneeded surgical procedures. It is common practice to undertake unneeded procedures on benign breast lumps, which account for over 40% of breast cancer cases.

Compared to mammograms, FNAC is a better predictor of breast cancer, according to a research by Stephen B et al. in 2021. The results show high sensitivity, specificity, positive and negative predictive value, and minimal errors when combining mammography and FNAC for early breast cancer diagnosis. This is due to the close and significant association between the two methods. Fine needle aspiration cytology is a straightforward, quick, fast, dependable, and painless diagnostic procedure, according to a research by Bisht DS et al. in 2022. Improve the diagnosis accuracy of breast lumps by using the FNAC in conjunction with the "triple test" for first inquiry in the outside patient department. Another application for the FNAC aspirate is in supplementary molecular testing.

III. MATERIALS AND METHODS

Source of data:

The Central lab and the Department of Pathology were responsible for the prospective cytology study and histopathology study, respectively. Covers the period from January 2020 to December 2022 and includes all cases received by the Department of Pathology at the Faculty of Medicine, KBNU, Gulbarga, from both public and private medical practices.

Sample Size: 100 Cases.

Sample size calculation for a continuous outcome measure

n = sample size for study group

In the reference study: Statistics of breast cancer in India Prevalence of breast cancer is 14.0%
P = 14.0 Q = 86

L = Permissible error was of P was 6.81 Power of study was 80.0
Sample size (n) = $Z^2\alpha PQ/L^2$

= $(1.96)^2$ x 38.0 x 62.0/ $(6.81)^2$

n = 3.845 X 14 X 86 /

n = 4629/46.81

n = 98.88

Sample size n = Round figure 100 breast cancer cases

Inclusion criteria: From January 2020 to December 2022, all cases of palpable breast lesions of all ages

received in the Department of Pathology, Faculty of Medicine, Khaja Banda Nawaz University, Gulbarga, from the Surgery and Obstetrics and Gynecology departments of the University's Medical Faculty as well as from other private doctors.

Exclusion criteria:

Patients not willing for FNAC.

Diseases of axillary breast tissue are not included.

Method Procedure Of FNAC:

Oral permission was acquired once the patient was informed of the operation. We used sterile swabs to clean the area around the lump after palpating it while the patient lay supine. The left hand was used to correct the edema. Aspiration was performed under negative pressure using a 22 to 23-gauge needle and a disposable syringe containing 10 cm3 of fluid. The material was sucked out of the needle once it had reached the needle hub, and negative pressure was released. A sterile gauze pad was placed directly on top of the lump to exert pressure right away. A succession of streaks were created by the substance being ejected onto the slides. Another slide was used to make streaks with a single light swipe. The slides were treated with Diff-Quick dye and then fixed in 95% ethyl alcohol. Giemsa staining required a small number of air-dried smears.

Cytological interpretation:

Our team used the NHSBSP breast reporting criteria to classify all of the lesions into one of five categories, C1 through C5.31

C1-In sufficiency Condition 2—No Harm

Atypia C3 is likely to be benign. C4-Probably cancerous Type 5 cancer.

We performed histopathological correlation. After the lump was removed, it was examined under a microscope using the regularly dyed hematoxylin-eosin slides. Mammographic correlation was performed when needed.

Statistical Analysis:

Based on these calculations, the diagnostic tool's sensitivity, specificity, positive predictive value, and overall accuracy were determined for fine needle aspiration in cases where biopsies had been conducted.

Sensitivity=TP/TP+FNx100 Specificity=TN/TN+FPx100

Positive predictive value=TP/TP+FPx100 Accuracy=TP+TN/TP+FP+FN+TNx100 Key:

TP-true positive TN-true negative FN-false negative FP-false positive

Standard Cytodiagnostic Criteria of Breast Lesions[1] C2 Category

Mastitis:

Acute mastitis with abscess formation usually occurs during lactation but can occur independently. The aspirate consists of sheets of neutrophils and foamy macrophages in a background of cell debris. Few reactive epithelial cells may be seen with nuclear enlargement and prominent nucleoli but the inflammatory background and few epithelial cells excludes the diagnosis of carcinoma.

Conditions giving rise to the chronic granulomatous inflammatory condition include tuberculosis, fungal infections, sarcoidosis, Wegener's granulomatosis, foreign body reaction to implanted silicon etc. Cytological features include sheets of epithelioid cells with abundant cytoplasm, elongated nuclei, Langerhan's giant cells, few lymphocytes, plasma cells and variable karyorrhectic debris. The diagnosis of tuberculosis should be confirmed by Z-N stainor culture. Cytology shows:

-A benign bimodal population of cells

-Inflammatory cells acute and/or chronic

-Regenerative epithelial atypia

-Histiocytes, epithelioid cells, multinucleated giant cells and plasma cells (granulomatous pattern)

-Microorganisms (infectious mastitis)

Benign Lesions:

Simple Cyst

Any lesion that aspirates more than 1 cc of fluid—whether clear, opaque, or turbid—and may range in color from green to brown to blood stained—is called a breast cyst.

- A Following aspiration of the fluid, the lump vanishes entirely.

- The aspirated fluid does not include any blood or necrotic debris.

- Few ductal/apocrine epithelial cells with cyst macrophages.
- The cells that cause inflammation might vary.

Fibroadenoma:

In contrast to the poorly defined and indurated lesions seen in fibrocystic diseases, which often manifest in the second and third decade, this benign tumor is freely mobile and appears as a confined distinct mass.

Cytology shows:

- Very high levels of cellularity
- Layers of ductal epithelial cells that are cohesive
- Protrusions of epithelial cells that resemble fingers or large antlers
- Quite a few bare bipolar nuclei
- Stromal fragments accompanied by infrequent myxoid transformation
- Minimal or nonexistent apocory cells or foam cells
- False positive diagnoses may occur due to hypercellularity or ductal atypia.

Phyllodes Tumor:

A cellular stroma and epithelial components make up this biphasic tumor. Important factors to consider while evaluating a tumor's behavior include its size, mitotic activity, stromal atypia, stromal overgrowth, and the relationship between the tumor's margin and the surrounding parenchyma.

Cytology shows:

-Cellular smears

-Biphasic population of epithelial and stromal elements

-Individual and intertwined hypercellular stromal pieces of spindle-shaped cells with aberrant nuclear membranes and, on occasion, nucleoli

Malignant phyllodes are characterized by chromosomal cell atypia and mitoses.

-Epithelial hyperplasia may be present

-Numerous naked nuclei can be seen (indistinguishable from fibroadenoma)

Fibrocystic Disease:

When it comes to individuals over the age of 30, this lesion is the most prevalent mass-producing one. Periods cause them to be sensitive and painful. Rarely well-defined, often bilateral, and multifocal. Cysts, apocrine metaplasia, stromalfibrosis, chronic inflammation, duct hyperplasia, and duct dilation are histologic characteristics.

Cytology shows:

- Collagenous sheets and honeycomb-shaped clusters of benign ductal epithelial cells with low to moderate cellularity
- Variegated stroma and adipose cells surround dispersed bipolar nuclei in the backdrop.
- Numerous foam cells, cyst macrophages, and apocrine cells.

Atypical Ductal Hyperplasia (C3 Category)

A variety of intraductal epithelial proliferations may occur, including atypical ductal hyperplasia, ductal carcinoma in situ, and intraductal hyperplasia without atypia.

Cytology shows:

- Large sheets of cohesive epithelial cells, with no or very few single cells, describe cell rich smears.
- A small number of myoepithelial cells and bare bipolar nuclei
- Nuclei that are crowded and overlapped
- Variegated nuclear atypia, mild to moderate

Specific Types of Breast Carcinoma Micropapillary Carcinoma (C4 Category)
Cytology shows:

-Epithelial cells mainly cohesive forming large sheets, often with holes or papillary fragments
-Absence of bare nuclei

-Variable mild to moderate epithelial atypia

-Necrotic debris, often calcium granules

-Macrophages

Malignant Lesions (C5 Category)

Infiltrating Ductal Carcinoma of No Special Type

Cytology shows:

- Smears with a mix of moderate to abundant cells
- Cells that are diseased and not tightly packed together
- An absence of distinct bipolar nuclei and myoepithelial cells
- Clusters, syncytial groupings, and the rare acinar pattern of malignant epithelial cells

- The symptoms of moderate to severe atypia include aberrant nucleoli and mitoses, nuclear enlargement, pleomorphism, an uneven nuclear membrane, and chromatin that is coarse to granular and clumped.
- Stromal desmoplasia including abnormal cells, collagen, and fibroblasts
- Neolumina within the cell nucleus in some instances
- Necrosis is unusual, more suggestive of ductal carcinoma in situ.

Metaplastic Carcinoma (C5 Category)

Metaplastic carcinoma is characterized by the presence of two separate components in a tumor. Sarcoid carcinoma, also known as spindle cell carcinoma, looks a lot like soft tissue sarcoma. Some examples of sarcomas are chondrosarcoma, osteosarcoma, fibrosarcoma, and others.

Metaplastic spindle cell carcinoma and malignant phyllodes tumors are indistinguishable. There have been descriptions of adenosquamous and squamous cell carcinomas.

Cytology shows:

-Spindle cells to squamous cells

-Nuclear pleomorphism

IV. RESULTS

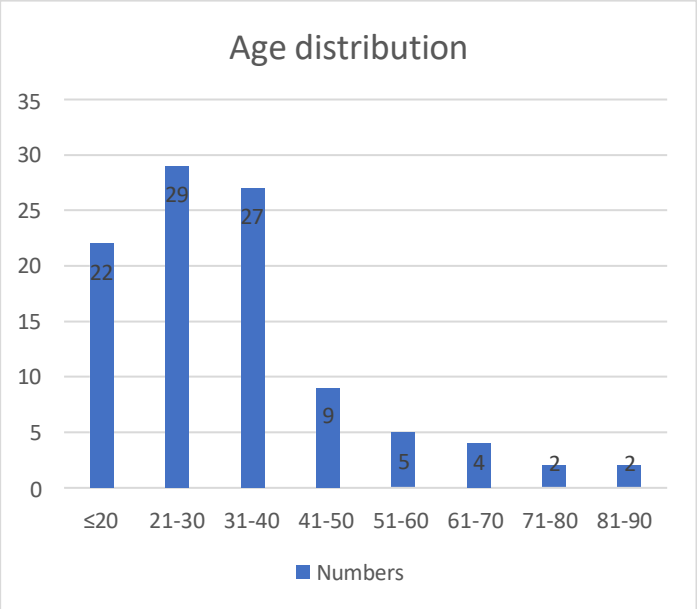
The current investigation makes use of FNAC data collected from 100 breast lesions between 2020 and 2022 at Khaja Banda Nawaz University's Department of Pathology, Faculty of Medical Sciences. Here are the key findings from the study:

Age Distribution

The age of the patients ranged from 11 to 90 years. There were 100 female patients. The age distribution is shown in Table.1

Table.1 Age distribution

Age group	Cases
≤20	22
21-30	29
31-40	27
41-50	09
51-60	05
61-70	04
71-80	02
81-90	02

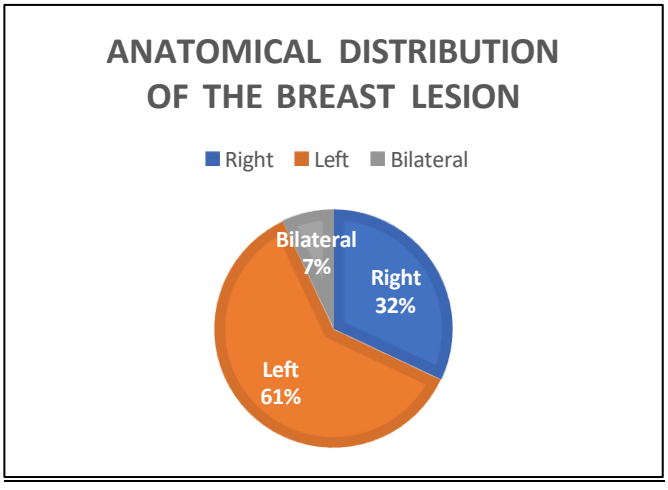


Majority of the patients seen were between 21-40 years of age.

Distribution Of Breast Cases in Relation To Right Or Left Breast

When looking at 100 instances, 32 had the lesion in the right breast and 61 in the left. Both sides of the body showed signs of damage in seven instances (Table 2).

Table. 2 Side and Incidence	
Side	**Numbers**
Right	32
Left	61
Bilateral	07
Total	100

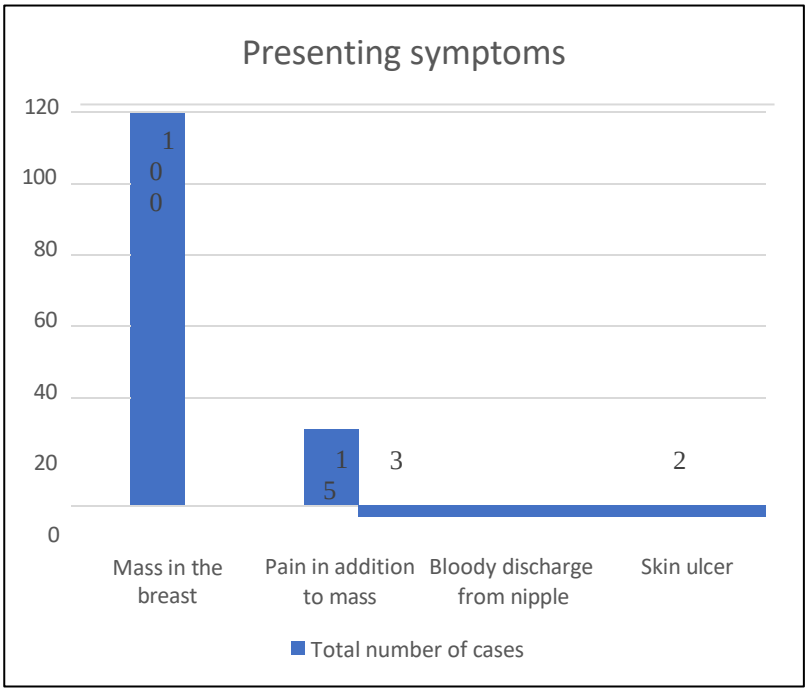


Presenting Symptoms:

A breast mass was the most prevalent first sign. This held true across the board. In addition to the mass, fifteen patients also had discomfort, three instances had bloody flow from the nipple, and two cases had ulceration around the mass (Table 3).

Table. 3 Presenting symptoms

Symptoms	Cases
Mass in the breast	100
Pain in addition to mass	15
Bloody discharge from nipple	3
Skin ulcer	2



Adequacy of the Aspirate:

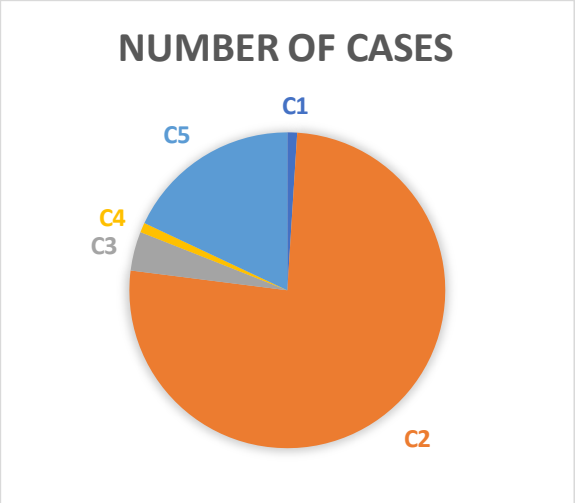
Out of 100 cases, 99 aspirates were adequate and one aspirate was

inadequate, hemorrhagic with few degenerated cells.

Cytology Result Categorization:

After reviewing the cytology of one hundred cases, we classified them into five groups, C1–C5. Among the examples shown in Table 3, there was one in the C1 category, seventy-six in the C2 category, three in the C3 category, one in the C4 category, and nineteen in the C5 category.

Table.3 Cytological categorization	
Category	**Cases**
C1	01
C2	76
C3	03
C4	01
C5	19



C1 Category Lesions:

One instance out of a hundred fell into the C1 group. A 40-year-old woman presented with a malignant, expanding lump (about 9x6 cm) on her left breast. Smears showed a lack of cell density and, on occasion, clusters of dead cells on a reddish-brown background. The substance is the same when aspirated again. We were unable to form a judgment about their ambitions. There were no microcalcification foci and the mammography results were nonspecific. The patient had a simple mastectomy (figure.1). The histopathology report revealed an infiltrating growth with a Herringbone pattern as a result of dense, lengthy fascicles of spindle cells interlacing. Pleomorphic vesicular nuclei and sparse cytoplasm characterized the elongated individual cells. There are mitotic figures seen at 3–4 hours after fertilization. Neutrophil infiltration was seen in specific foci of necrosis. In other spots, the skin that was on top was lax. Figure 2 shows the histological diagnosis of fibrosarcoma. Inflammatory lesions classified as C2:

According to the results of the cytology, 9 out of 76 patients had inflammatory pathology. All the way from 29 to 48 years old, the patients were there.

An individual came in with a brief history of a lump in the breast along with discomfort, soreness, and a localized increase in temperature. What came out of the aspirate looked like pus. Neutrophil sheets, a few of ductal epithelial cells, and stromal fragments were seen in the smears. This case's cytology results confirmed the presence of a breast abscess.

Figure 3 shows the inflammatory backdrop in eight instances of granulomatous mastitis, which are characterized by clusters of epithelioid cells, giant cells, plasma cells, and lymphocytes. A small number of ductal epithelial cells are also present. In every instance, the Z-N stain did not detect AFB. Histopathology showed the presence of non-tuberculous granulomatous mastitis after surgical excision (figure.4).

C2 category benign tumor lesions: Fibroadenoma:

The benign tumor lesion most often seen in 45 instances was fibroadenoma. Individuals undergoing treatment ranged in age from fourteen to forty-plus. A poorly defined mass was the only example that did not otherwise exhibit a well-defined mass. Eleven instances had the tumor in the right breast, thirty-nine in the left, and five in both breasts. Fibroadenoma hallmarks were seen in all of the patients' smears. Cohesive clusters of a bimodal population of benign ductal epithelial cells and myoepithelial cells organized in a branching antler horn pattern against a backdrop of naked nuclei and stromal fragments formed the basis of the diagnosis, and the majority of the cells were highly cellular.

The bulk of the aspirates showed cells mostly in monolayered sheets (figure-6), whereas seventeen aspirates exhibited predominantly branching antlers (figure-5). A small number of aspirates showed both antlers and monolayered sheets. A large number of naked nuclei in the background, characteristic of fibroadenomas, were seen in thirty of the cases. Only one instance had cyst macrophages, and apocrine cell clusters were seen in a small number of patients. Histopathological confirmation of fibroadenoma confirmed surgical excision in every patient (figures 7 and 8).

Fibrocystic Disease

Fourteen individuals had fibrocystic breast disease verified by cytology. From 28 to 75 years old, the patients' ages ranged widely. The mass was located in the right breast in 6 cases, in the left breast in 6 cases and involved both the breasts in 2 cases. These manifested as somewhat to weakly celluloid lumps, with smears containing a variety of cells, including inflammatory cells, cyst macrophages, and degraded ductal and apocrine epithelial cells. Histology results after surgical excision were indicative of fibrocystic disease (figure.10).

Benign Proliferative Breast Disease:

Cytology confirmed benign proliferative breast disease in two instances. The patients' ages ranged from nineteen to thirty-seven. One patient had the lump in their right breast, while one patient had it in their left. Smears showed a small number of benign clusters of epithelial cells and myoepithelial cells organized mostly in sheets, and the masses themselves were weakly to moderately developed. Histopathology confirmed the presence of tubular adenomas in both instances, which led to surgical removal.

Phyllodes Tumor:

A 19-year-old woman came in complaining of a 3x3 cm lump in her right breast. On top of a hemorrhagic backdrop, the smear displayed moderate cellularity with clusters of spindle cells and a dearth of ductal cells. Phyllodes tumor was the cytological diagnosis. We performed a lumpectomy on the patient. Histopathology revealed breast parenchyma and a well-defined mass (no capsule) with bilayered epithelium, spindle cells in the intralobular stroma, and a proliferative network of ducts organized in leaf-like projections. The patient was determined to have a benign phyllodes tumor.

C3 Category-Atypical Ductal Hyperplasia

The distribution of atypical lesions is shown in table.

Table.4 Cytological diagnosis	**Number**	**Percentage**	**Histopathology diagnosis**	**Number**	**Percentage**
Fibrocystic disease with atypia	02	66.6%	Fibrocystic disease with atypical ductal hyperplasia	01	33.3%

			proliferative breast disease with atypia and intraductal papilloma	01	33.3%
Atypical ductal hyperplasia	01	33.3%	Infiltrating ductal carcinoma	01	33.3%

On three instances, cytology confirmed a diagnosis of atypia, likely benign, falling into the C3 group. The patients—aged 34, 35, and 48—presented with three lumps that were difficult to pinpoint: two in the right breast and one in the left. One patient's smears revealed clumps of ductal epithelial and myoepithelial cells that were cohesive, with little naked nuclei and background stromal fragments. Very few clusters exhibited atypia, which manifested as mild to moderate nuclear pleomorphism, focal nuclear overlap, and crowding with conspicuous nucleoli. The result was a cytological diagnosis of atypical ductal hyperplasia, which is likely benign. Breast imaging revealed a BIRADS 4a. Surgeons removed the tumor. Histopathology revealed characteristics of infiltrative ductal carcinoma. IHC revealed the following: ER: +VE, PR: +VE, and HER2 neu: -VE.

Inflammatory cells, cyst macrophages, ductal epithelial cells, and a small number of atypical cells were all seen in the two patients' smears. The pathology report indicated fibrocystic disease with unusual ductal hyperplasia, which is likely benign. The decision to remove the tumor was based on this. One case's histopathology revealed fibrocystic disease characteristics along with atypical ductal hyperplasia. The second case's sections revealed adenosis, cystically dilated ducts, and widespread fibrosis. There is modest atypia and intraductal papillomatosis in the case of cystically dilated ducts. There is nuclear atypia and cribriform intraductal hyperplasia in a few of the ducts. There is apocrine alteration in a few of the glands. Stroma displays an infiltration of persistent inflammation. The result was a proliferative breast disease diagnosis with atypia and intraductal papilloma.

C4 Category Lesion:

This instance included a 30-year-old woman with a 6-by-5-cm tumor in her left breast. Clusters of spindle cells with significant nuclear atypia were seen in the smear, indicating an increase in cellularity. Cytological analysis revealed a phyllodes tumor, which is very suggestive of cancer. We performed a lumpectomy on the patient. The trabeculated tumor had a well-defined border and had a greyish-white color. The results of the histopathology examination revealed distinct boundaries, significant stromal atypia, and elevated cellularity. Borderline phyllodes tumor was the most likely diagnosis based on the symptoms.

C5 Category-Malignant Lesions:

The distribution of malignant lesions is shown in table.5

Table.5 Cytological diagnosis	**Number and percentage**		**Histopathology diagnosis**	**Numbers and Percentage**	
Ductal carcinoma	13	68.42	Ductal carcinoma	06	31.6%

		%	Infiltrative ductal carcinoma	07	36.8%
Infiltrative ductal carcinoma with Paget's disease	02	10.5%	Infiltrative ductal carcinoma with Paget's disease	02	10.5%
Mucinous carcinoma	02	10.5%	Mucinous carcinoma	02	10.5%
Lobular carcinoma	01	5.2%	Infiltrating lobular carcinoma	01	5.2%
Malignant Phyllodes tumour	01	5.2%	Malignant Phyllodes tumour	01	5.2%

The cytology results showed that 19 of the cases were cancerous. There was a wide age range among the patients, from 30 to 90. Table 6.

Table.6 **Age group**	**Numbers**	**Cases**		
		Benign	**Borderline**	**Malignant**
11-20	22	22	0	0
21-30	29	27	1	1
31-40	27	23	0	4
41-50	09	3	0	6
51-60	05	1	0	4
61-70	04	0	0	4
71-80	02	1	0	1
81-90	02	0	0	2

There were 19 instances of cancer; 13 of those cases had ductal carcinoma at cytology, and 2 of those cases had infiltrating ductal carcinoma with Paget's disease. We performed a mastectomy and correlated the results with histology. Among the thirteen cases, four were determined to be of the ductal carcinoma NOS type. Ductal carcinoma in situ was the diagnosis in one instance. Medullary cancer was the diagnosis in one instance. IHC revealed the following: HER2neu: +VE, ER: +VE, PR: -VE

For seven patients, infiltrating ductal carcinoma was the official diagnosis. The histological confirmation of two instances of infiltrating ductal carcinoma with Paget's disease followed cytological diagnosis. Two instances of mucinous carcinoma and four cases of IDC with lymph node metastases The histological examination confirmed the cytological diagnosis of one lobular carcinoma and one malignant phyllodes tumor.

Statistical Analysis

We assessed the efficiency of FNAC by correlating cytological diagnosis with histology. For each indicator, we determined its total sensitivity, specificity, accuracy, predictive value (for positive results), and false negative percentage.

Here are the cytology-related inconsistencies out of 100 biopsies: Despite a cytological diagnosis of category 1 (inadequate) and a radiological BIRADS-4 rating, histology confirmed the presence of fibrosarcoma in one patient. (Certain diagnostic results are inaccurate).

Histopathology revealed infiltrating ductal cancer in one instance from a category 3 diagnosis of atypical ductal hyperplasia. (Certain diagnostic results are inaccurate).

Despite a category 4 questionable diagnosis, one instance was really borderline phyllodes. (Really positive).

Thus, in 2 out of 100 instances, the cytology diagnosis did not align with the histology findings.

TP=18 FN=2 FP=1 TN=79

Table 7- Overall statistical analysis

Value	**Formula**	**%**
Sensitivity	TP(18)/TP(18)+FN(2)x100	90%
Specificity	TN(79)/TN(79)+FP(1)	98.75 %
Positive predictive value	TP(18)/TP(18)+FP(1)x100	94.7 %
False negative percentage	FN(2)/TP(18)+FN(2)x100	10%
Accuracy	TP(18)+TN(79)/TP(18)+TN(79)+FP(1)+FN(2)	97%

Statistical Analysis on malignant lesions:

The histology results confirmed the cytology diagnoses in 19 of the 100 patients who underwent biopsies. A cytologically confirmed C3 instance was later shown to be cancerous. Because of this, the FNAC was 97% accurate in diagnosing malignant lesions, 90% sensitive, and 98.75% specific.

V. DISCUSSION

We examined the cytomorphological characteristics of 100 breast patients using FNAC samples. The bulk of the patients were between the ages of 21 and 40, however their ages varied from 11 to 90. The lower inner quadrant had the fewest masses out of the 100 instances, whereas the left breast had the most in the upper outer quadrant. The results were consistent with those of previous research.

The aspirates were sufficient in 99 out of 100 instances, whereas 1 case was unsatisfactory for interpretation.

The FNAC findings were classified into five groups, C1 through C5, according to the reporting requirements established by NHSBSP31.

C1 category

For insufficient instances, the C1 category is there. One instance occurred. Patients complained of a big lump that had begun to fungus. In a hemorrhagic backdrop, the smears exhibited low cellularity. The substance is the same when aspirated again. We were unable to form a judgment about their ambitions. There were no microcalcification foci and the mammography results were nonspecific. Simple mastectomy was done. The histological examination confirmed the presence of fibrosarcoma. How well FNAC works depends on how knowledgeable and experienced the people who collect the material and analyze the smears are.

C2 Category Benign Lesions

There were 42 benign tumors, 9 inflammatory lesions, and 19 instances of benign proliferative breast disease/fibrocystic disease out of 76 benign lesions classified as C2.

An individual came in with a brief history of a lump in the breast along with discomfort, soreness, and a localized increase in temperature. What came out of the aspirate looked like pus. Neutrophil sheets, a few of ductal epithelial cells, and stromal fragments were seen in the smears. This case's cytology results confirmed the presence of a breast abscess.

Eight instances were determined to be granulomatous mastitis, characterized by clusters of epithelioid cells, giant cells, plasma cells, lymphocytes, and a small number of ductal epithelial cells set against an inflammatory backdrop. In every instance, the Z-N stain did not detect AFB. After the surgical excision, histology verified that the mastitis was not tuberculous.

It is fairly uncommon to observe granulomatous inflammation of the breast. This is a result of the fluids produced by the breasts. In some instances, epithelial atypia and radiological mimicry of cancer might be cause for concern. The increasing prevalence of extrapulmonary TB, however, makes a tuberculous etiology worthy of serious consideration. 39 and 40,

Among benign tumors classified as C2, fibroadenomas were the most prevalent. The ages varied from fourteen to forty-five. The bulk of the aspirates (40 out of 100) had the characteristic hallmarks of fibroadenomas, including moderate to high cell counts, clusters of one-branching antler horns, a display of naked nuclei, and remnants of stromal tissue. One of the key diagnostic features of fibroadenoma is a background shower of naked nuclei. Almost all of the instances showed this, with the exception of five with very little bare nuclei. Antler hornclusters including ductal epithelial cells and myoepithelial cells provided diagnostic support in these five instances.

Two FA aspirates revealed clusters of apocrine cells in addition to cyst macrophages, whereas two instances revealed cyst macrophages alone. Cases with confined masses and distinctive cell clusters resembling antler horns led to a diagnosis of FA. Furthermore, there were fewer clusters of apocrine cells and cyst macrophages in these incidents. There could be a lot of cytologic overlap between fibroadenoma and fibrocystic illness. In these circumstances, it's important to be cautious with clinical correlation, background bare nuclei count (which is high in FA), and the appearance of distinctive antlers.

There was one report of a benign phyllodes tumor from the cytology department. In a hemorrhagic backdrop, the smear displayed moderate cellularity with sheets of spindle cells, rare large cells, and a small number of ductal cells. Histopathology revealed a benign phyllodes tumor after the patient had surgery. Based on stromal cellularity and pleomorphism, single stromal cells, and mitoses, Bhattarai S et al. reported 80 phyllodes tumor cases and categorized them. We scored each of them to classify the lesions as benign, borderline, or malignant based on the sum of their scores. The current investigation focuses on a single benign phyllodes tumor instance, which consisted mostly of stromal cells with occasional ductal epithelial cells. There were no signs of mitoses or atypia. In patients with a history of recurrent tumors, it is important to remember that phyllodes tumors might return, particularly in cases where insufficient surgical clearance occurs. There is no advancement when there is a recurrence.

Cytology confirmed benign proliferative breast disease in two instances. The patients ranged in age from 19 to 37 years. One patient had the lump in their right breast, while one patient had it in their left. weakly to moderately cellular smears revealed a few of benign clusters of epithelial cells and myoepithelial cells organized mostly in sheets, and these tumors varied in size from weakly defined to well-formed. Both patients had surgical excision, and histology confirmed the presence of tubular adenomas.

Cytology confirmed fibrocystic breast disease in fourteen patients. There was a wide age range among the patients, from 28 to 75 years. Six cases involved the right breast, six involved the left, and two involved both breasts. The masses ranged from poorly defined to well-formed, and the smears revealed cyst macrophages, few degenerated ductal/apocrine epithelial cells, and variable inflammatory cells. These characteristics are typical of fibrocystic tumors. Histopathological examination revealed characteristics of fibrocystic disease after surgical resection.

C3 Category-Atypical Ductal Hyperplasia

On three instances, cytology confirmed a diagnosis of atypia, likely benign, falling into the C3 group. The patients—aged 34, 35, and 48—presented with three lumps that were difficult to pinpoint: two in the right breast and one in the left. One patient's smears revealed clumps of ductal epithelial and myoepithelial cells that were cohesive, with little naked nuclei and background stromal fragments. A minimal number of clusters exhibited atypia, which manifested as mild to moderate nuclear pleomorphism, focal nuclear overlap, and crowding with conspicuous nucleoli. The result was a cytological diagnosis of atypical ductal hyperplasia, which is likely benign. Breast imaging revealed a BIRADS 4a. Surgeons removed the tumor.

Histopathology revealed characteristics of infiltrative ductal carcinoma. IHC revealed the following: ER: +VE, PR: +VE, and HER2 neu: -VE. This led to the conclusion that his case was a false negative. This finding was in line with the majority of the published research, which found cancer rates in category C3 to be over 30%, and which vary from 8.6% to 52%.22 Factors that contribute to false negative findings include small tumor size, hypocellularity, sampling mistake during FNAC, and a small number of histological tumor forms, including low nuclear grade, lobular carcinoma, scirrhous carcinoma, and highly differentiated intracystic carcinoma. The most prevalent reason for false negative findings, especially in cases of tiny tumors, is sampling error. A triple-test that compares FNAC findings to those from clinical and radiological investigations may significantly lower or eliminate the false-negative rate. Patients in category C3 should ideally undergo the triple test, as previously suggested (67), and our research adds credence to that approach.

Inflammatory cells, cyst macrophages, ductal epithelial cells, and a small number of atypical cells were all seen in the two patients' smears. The pathology report indicated fibrocystic disease with unusual ductal hyperplasia, which is likely benign. The decision to remove the tumor was based on this. One case's histopathology revealed fibrocystic disease characteristics along with atypical ductal hyperplasia. The second case's sections revealed adenosis, cystically dilated ducts, and widespread fibrosis. There is modest atypia and intraductal papillomatosis in the case of cystically dilated ducts. There is nuclear atypia and cribriform intraductal hyperplasia in a few of the ducts. There is apocrine alteration in a few of the glands. Stroma displays an infiltration of persistent inflammation. The result was a proliferative breast disease diagnosis with atypia and intraductal papilloma. Cytology may sometimes amplify the appearance of nuclear alterations, therefore this must be considered. The hallmarks of atypia at cytology are nuclear enlargement, nuclear crowding, and nuclear overlapping. Similar to what happened here, this might be a side effect of reactive alterations brought on by inflammation. (regenerative atypia). The lack of inflammation is necessary for the reading of true atypia. The current instance underwent an excision biopsy as per the guidance of the NHSBSP31,5 for the C3 category.

C4 Category Lesions:

This instance included a 30-year-old woman with a 6-by-5-cm tumor in her left breast. Clusters of spindle cells with significant nuclear atypia were seen in the smear, indicating an increase in cellularity. Cytological analysis revealed a phyllodes tumor, which is very suggestive of cancer. We performed a lumpectomy on the patient. The trabeculated tumor had a well-defined border and was grey-white in color. The results of the histopathology examination revealed distinct boundaries, significant stromal atypia, and elevated cellularity. Borderline phyllodes tumor was the most likely diagnosis based on the symptoms. There was a good correlation between the grade and the FNA results in phyllodes tumors. Benign phyllodes tumors were the only ones that showed a bland scattered population of cells; borderline cases, on the other hand, showed unusual dispersed cells. There was an epithelial component resembling FA in both instances. Malignant phyllodes tumors, on the other hand, have an anaplastic, mitotically dominating stromal component with either no epithelial component at all or a much reduced amount. The work of Emad et al. was comparable to this.

Features such as tumor margin (pushing vs. infiltrative), degree of stroma overgrowth, stromal cellularity, tumor necrosis, pleomorphism, and the number of mitotic figures per high-power field may classify phyllodes tumors as benign, borderline, or malignant. Surgical excision with large resection margins or simple mastectomy is the treatment of choice for phyllodes tumors, regardless of grade. The rate of local recurrence has a weak correlation with the histological grade. however it's also good for metastasis. Recurrence is more likely to occur after simple enucleation, such as an FA procedure, or after partial excision. Hence, in order to plan the scope of surgery, a preoperative diagnosis of phyllodes tumors is necessary. For the study of palpable breast masses, FNA is a routinely utilized first-line preoperative test. Clinical and mammography findings, when paired with the procedure's sensitivity, bring the diagnosis of breast cancer closer to 100%.

Category 5 lesions:

There were 19 instances of cancer; 13 of those cases had ductal carcinoma at cytology, and 2 of those cases had infiltrating ductal carcinoma with Paget's disease. We performed a mastectomy and correlated the results with histology. Four of the thirteen cases were determined to be ductal carcinoma NOS type. Ductal carcinoma in situ was the diagnosis in one instance. Medullary cancer was the diagnosis in one instance.

For seven patients, infiltrating ductal carcinoma was the official diagnosis. The histological confirmation

of two instances of infiltrating ductal carcinoma with Paget's disease followed cytological diagnosis. Lymph node metastases occurred in 4 instances of IDC. After cytological diagnosis, histopathology revealed two instances of mucinous carcinoma, one case of lobular carcinoma, and one case of malignant phyllodes tumor.

The histology results confirmed the cytology diagnoses in 19 of the 100 patients who underwent biopsies. A cytologically confirmed C3 instance was later shown to be cancerous. A triple-test that compares FNAC findings to those from clinical and radiological investigations may significantly lower or eliminate the false-negative rate.

Thus, the FNAC demonstrated a sensitivity of 98%, specificity of 100%, and accuracy of 98.44% in the detection of malignant lesions, with only a 2% false negative rate.

SUMMARY

Our goal in conducting this research was to confirm FNAC's accuracy and reliability as a preoperative diagnostic tool for breast lesions by comparing their cytomorphology to histopathology in cases where surgical excision was performed.

One hundred instances made up the research.

The age range of the patients examined was mostly 21–40 years. A breast mass was the presenting symptom in every single case.

The left breast was where the bulk of the masses were located. We found the following grouping of FNAC results:

Case C1-01 C2-76 instances Cases involving C3-03 Case C4-01 C5-19 instances

In the benign C2 group, there were 76 cases: 45 fibroadenomas (the majority), 1 phyllodes tumor, 1 lipoma, 1 lactating adenomas, 19 benign proliferative breast diseases/fibrocystic diseases, and 9 inflammatory lesions.

Of the 19 malignant lesions classified as C5, 15 were duct carcinoma-NOS type, 2 were mucinous carcinoma, and 1 was malignant phyllodes.

The study's overall statistical results are as follows: Reliability: 90%

Accuracy: 98.55%

Goodness of prediction: 94.7% Ten percent is the false negative rate. Accuracy: 97%

VI. CONCLUSION

The study's sensitivity for detecting cancerous tumors was 90%. Therefore, for the purpose of preoperative diagnosis of benign and malignant tumors, FNAC is a legitimate and useful method. Performing a physical examination, a mammogram, and FNAC all at once allows for a more accurate and trustworthy diagnosis of early breast cancer because to the high sensitivity, specificity, positive predictive value, and few mistakes of the data.

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