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ORIGINAL ARTICLE

Characterization of Breast Lesions Based on Fine Needle Aspiration Cytology and Histopathological Analysis

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ABSTRACT
The FNAC material from 100 patients enrolled in Bharath Institute of Higher Education and Research's Department of Pathology was analysed in this study. Overall, the sensitivity 1s is 94.44 percent, the specificity is 100 %, the positive predictive value is 100 percent, the negative predictive value is 98 percent, and the diagnostic accuracy is 98.5%t. Ninety-six percent of the cases involved women. Between the ages of 31 and 40, benign lesions peaked, while malignant lesions peaked between the ages of 41 and 50. The most prevalent benign tumour was fibroadenoma. Among malignant lesions, NOS ductal carcinoma was the most common type (77.77%).
Keywords: Breast lesions, fine-needle aspiration cytology

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INTRODUCTION

Two ventral bands of thickened ectoderm, the mammary ridges/milk lines, are seen in the embryo at the 5th or 6th week of development. Pairs of breasts develop along these ridges in most mammals, which run from the base of the forelimb (future axilla) to the region of the hind limb (inguinal area). In the human embryo, these ridges are not visible and disappear after a short period of time 1. Each breast originates when ectoderm infiltrates the mesenchyme and forms a primary tissue bud. The primary bud, in turn, sets in motion the formation of 15 to 20 secondary buds [1-3].

Secondary buds produce epithelial cords that extend into the surrounding mesenchyme. The development of major (lactiferous) ducts leads to the formation of a shallow mammary pit. A growth of mesenchyme turns the breast pit into a nipple during infancy [4-6]. Males and females have identical breasts at birth, displaying only the existence of main ducts. The female breast does not develop until puberty, when it enlarges in response to ovarian eostrogen and progesterone, which cause epithelial and connective tissue elements to proliferate3. The breasts, on the other hand, remain undeveloped until pregnancy. Bhattarai *et al*. evaluated 80 breast aspirates of histologically confirmed phyllodestumours in 2000 to classify them as benign, borderline, or malignant. They came to the conclusion that in the vast majority of cases, cytologic diagnosis and subclassification of phylloidestumours were possible 4 Kim et al. examined the accuracy of FNAC of breast in 246 instances out of 672 total cases with histopathologic confirmation in a research published in 2000 [7-9].

To assess the results, they were sorted into five categories: benign, atypical, suspicious, malignant, and unsatisfactory. They discovered that knowing FNAC's capabilities and limitations boosted its value in the detection of breast lesions [5]. In 154 cases, histological diagnosis was available during the two-year period. 71 of the 154 patients had also been subjected to fine needle aspiration cytology [6]. For breast lesions, the sensitivity and specificity of cytopathological diagnosis were 100% and 94.6 percent, respectively [10-11]. "Well confined carcinoma consists of poorly differentiated cells with limited stroma and significant lymphocytic infiltration," according to the World Health Organization. Despite the high grade of the tumour, the prognosis is favourable.

MATERIAL AND METHODS

A prospective study of 100 breast aspirates was conducted at the Department of Pathology, Bharath Institute of Higher Education and Research over a 24-month period from August 2011 to July 2013, and were subjected to a FNAC process after a complete history, general physical, and local examination. Following that, the cases were followed up on, and respected specimens from pertinent individuals were examined. H&E stain, as well as appropriate special stains and immunohistochemistry, were used to stain the slides [5-8].

RESULTS

The most prevalent clinical presentation was a mass without discomfort (60 percent), followed by a mass with pain (40 percent) (29 percent). Upper outer quadrant (47%), upper inner quadrant (25%), upper outer and inner (11%), lower inner (9%), lower outer (3%), axilla (3%), and subareolar region (3%) were the most common sites involved (2%). 100 fine needle aspirates were studied and classified into five groups, ranging from C1 to C5. There were two cases in the C1 (inadequate) category, 71 in the C2 (benign) category, one in the C3 (atypia presumably benign) category, none in the C4 (suspicious of malignancy) category, and 26 in the C5 (malignant) category. Fibroadenoma (39 %) was the most common type of lesion, followed by malignant lesions (26%). Biopsy was received in 67 of the 100 instances of FNAC breast cancer. Except for two cases, where one case of fibroadenoma was classified as fibrocystic disease on histology and one case of fibrocystic disease was diagnosed as ductal carcinoma NOS type on biopsy, all cases linked well. The commonest presenting symptom was a mass alone followed by mass and pain.

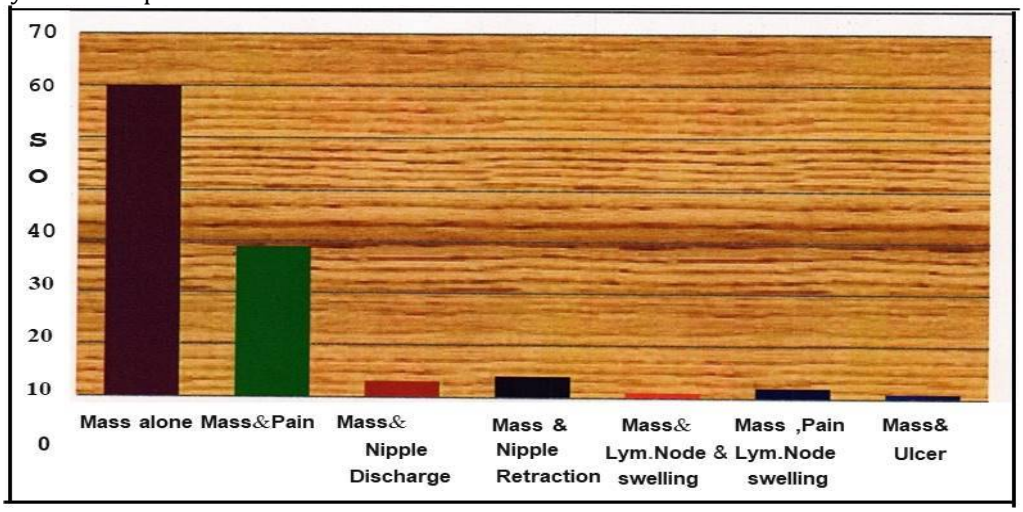

Figure. 1 Presenting Symptoms

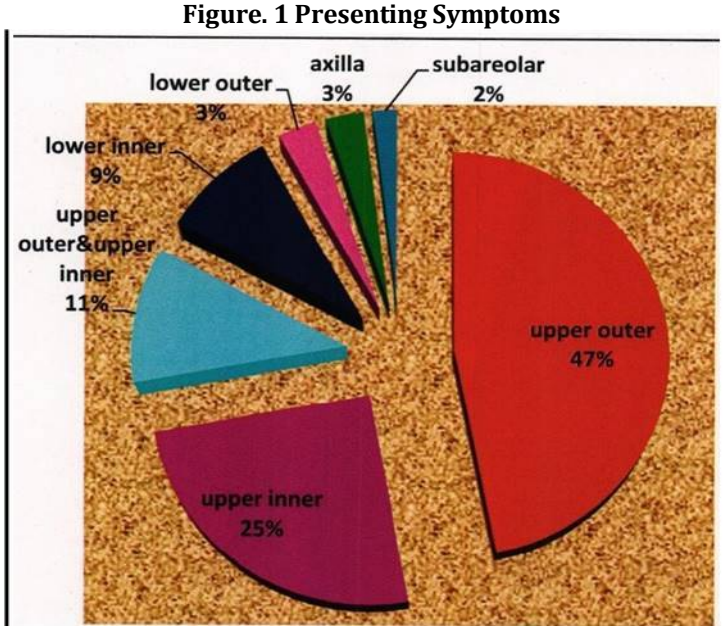

Figure.2 Anatomical Quadrant Distribution of Breast Lesions

Majority (47%) of the lesion was seen to be located the upper outer quadrant.

Table. 1. FNAC diagnosis of the lesions

Cytological Categorization	List of FNAC Lesions	Number	Percentage (%)
C1(Inadequate)	Inadequate	2	2
C2 (Benign)	Fibroadenoma	39	71
	Fibrocystic Disease	13	
	Gynaecomastia	5	
	Mastitis	5	
	Galactocele	1	
	Nipple Adenoma	1	
	Axillary Tail Breast	3	
	Benign Phylloides Tumour	3	
	Ductal Epithelial Hyperplasia	1	
C3 (Atypia probably benign)	Atypical Epithelial Hyperplasia	1	1
C5 (Malignant)	Positive For Malignancy	26	26
	Total	100	100

Out of 100 cytological smears ,2 cases reported C1category,71 cases in C2 category, 1 cases in C3 category, no case in C4 category and 26 cases in C5 category. Among the total lesions, fibroadenoma (39%) was predominant followed by malignant lesions (26%).

TABLE. 2. Cyto-histopathological correlation of breast lesions

S. No	Cytological Diagnosis	No. of Cases	Histopathological Diagnosis	No. of Cases	No. of Correlated cases
1	Fibroadenoma	31	Fibroadenoma	30	30/31
			Fibrocystic Disease	1	
2	Fibrocystic Disease	9	Fibrocystic Disease	8	8/9
			Ductal Carcinoma NOS Type	1	
3	Gynaecomastia	3	Gynaecomastia	3	3/3
4	Nipple Adenoma	1	Nipple Adenoma	1	l/1
5	Axillary Tail Breast	3	Axillary Tail Breast	3	3/3
6	Benign Phylloides Tumour	2	Benign Phylloides Tumour	2	2/2
7	Ductal Epithelial Hyperplasia	1	Fibro adenomatoid Hyperplasia	1	l/1
8	Positive for Malignancy	17	Ductal Carcinoma Nos Type	13	17/17
			Ductal Carcinom in Situ	1	
			Medullary Carcinoma	1	
			Mucinous Carcinoma	1	
			Carsino sarcoma	1	

Seventeen individuals received surgery out of the 26 malignant cases identified on cytology. 16 cases involved the right breast, 9 cases involved the left breast, and 1 case involved both breasts. In 16 cases, the upper outer quadrant was involved, the lower outer quadrant was involved in two cases, the upper inner quadrant was involved in four cases, and both the upper outer and inner quadrants were implicated in four cases. The participants ranged in age from 33 to 78 years old. Histopathology revealed 13 cases of ductal

carcinoma NOS type, one case of ductal carcinoma in situ, one case of mucinous carcinoma, one case of medullary carcinoma, and one case of carcinosarcoma.

Cell-rich smears with neoplastic cells in sheets, irregular aggregates, and singles with big, pleomorphic cells amid a backdrop of necrotic debris were seen in ductal carcinoma in situ cytology (fig 3a). The ducts had a solid development of big pleomorphic tumour cells with central necrosis on histopathology (comedo pattern). The ductal carcmomaFnac revealed highly cellular smears with loose cohesive clusters of ductal epithelial cells with pleomorphic, hyperchromatic nuclei, clumped chromatin, and uneven nuclear membranes. Istopathology revealed a single population of ductal epithelial cells invading the stroma with pleomorphic and hyperchromatic nuclei.

A 57-year-old woman with a mass and nipple retraction for 6 months had numerous pools of mucin with aggregates and cell balls of tumour cells with mild nuclear atypia and chicken-wire blood arteries, according to her cytology. Mucinous cancer was diagnosed cytologically. The diagnosis was confirmed by histopathology, which revealed islands of tumour cells "floating in a sea of mucus" (fig 3b). Mucin was detected using the Periodic acid Schiff (PAS) stain. A 65-year-old woman presented with a one-month history of mass and pain. The smears were frequently hypercellular, with big tumour cells in the foreground and reactive lymphocytes and plasma cells in the background. A medullary cancer diagnosis was made based on cytology (fig-3c). Histopathology validated the diagnosis, which revealed a broad pattern of development with little or no glandular differentiation. The tumour cells were big and pleomorphic, with large nuclei and conspicuous nucleoli, as well as multiple mitoses and a lymphoplasma cytic infiltration around the tumor's periphery.

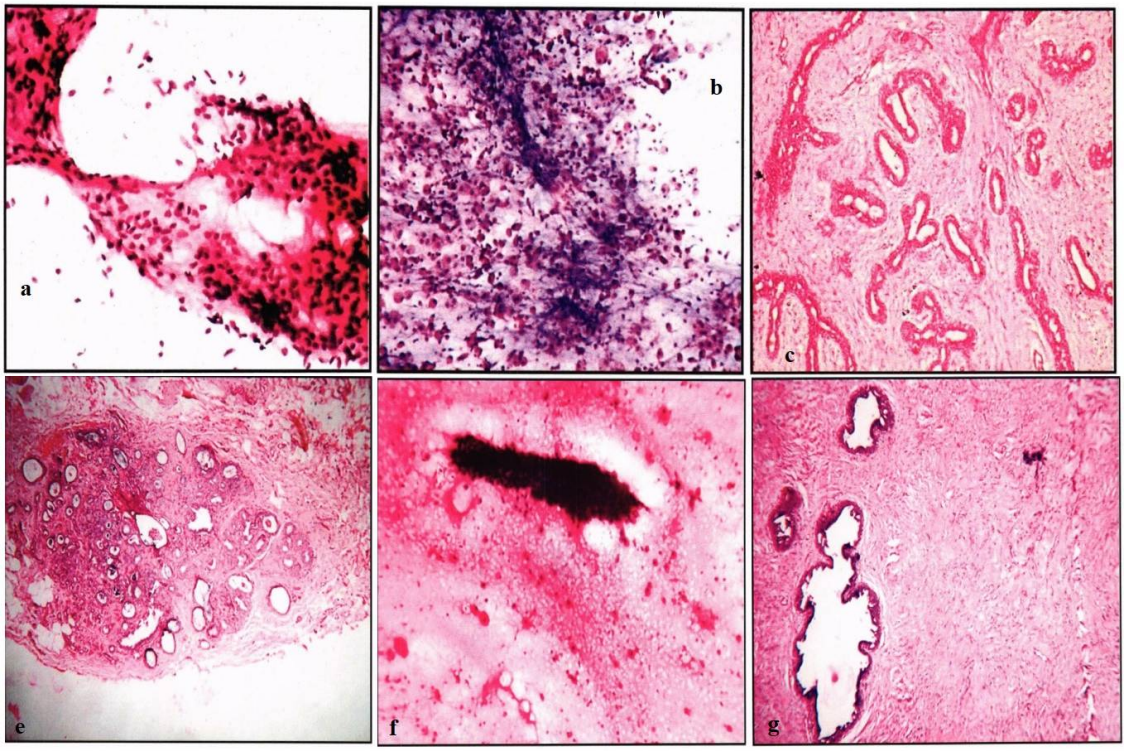

Fig. 5. FNAC Fibroadenoma, (**a**) Cell clusters in an aspirate of fibroadenomato show bimodal population of cells and barenuclei amidst ductal epithelial cells.H&E, 40x; (**b)** FNAC Mucinous Carcinoma- abundant pools and strands of mucin with aggregates and cell balls of tumor cells. Moderate nuclear atypia and chicken-wire blood vessels are seen, **H&E, (1**0x); (**c**) HPE Fibroadenoma - pericanalicular pattern, the regular round or oval glandular configuration of the glands is maintained. The tubules are composed of cuboidal cells with round uniform nuclei resting onamyo-epithelialcell layer.H&E (40x); (**d)** Nipple Adenoma -breast parenchyma showing cystically dilated ducts, some of them showing papillary formation lined by epithelial and myoepithelial cells with ovalnuclei without atypiaina densestroma. H&E (10x); (**f**) FNAC Ductal Epithelial Hyperplasia-the cells are benign and variable in shape and size arranged in a swirling pattern and two distinct cell populations and cell streaming with overriding nuclei are seen; (**g**) Fibro adenomatoid Hyperplasia-proliferating mammary ducts showing cystic dilatation and epithelial hyperplasia in a background of abundant Stroma and calcification, H&E (10x)

Clusters of spindle-shaped cells with pleomorphic and hyperchromatic nuclei coexisted with round to polygonal epithelial cells with hyperchromatic nuclei and occasional mitotic patterns in a myxoid background in smears from a 62-year-old woman. On cytology, a differential diagnosis of carcinosarcoma and malignant phylloides was made. Pleiomorphic spindle-shaped cells with hyperchromatic nuclei were detected on histopathology, as were a few ducts lined by malignant epithelial cells with extensive mitotic patterns and regions of cartilaginous tissue. The diagnosis of cars1nosarcoma was made, and immunohistochemistry was used to confirm it. The epithelial marker Cytokeratin and the mesenchymal marker vim entin (fig-4 a-e) for the lesion were both positive, confirming the diagnosis. The presence of CD117 ruled out the possibility of a malignant phylloides tumour.

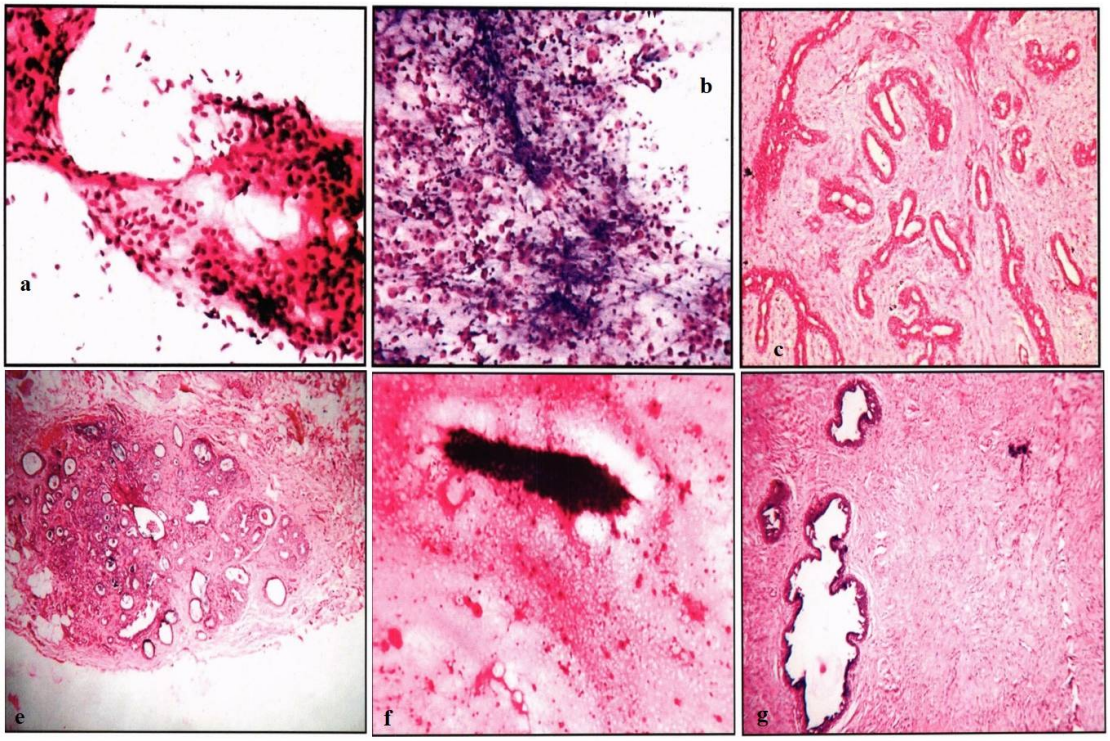

Fig. 6. (a)-HPE Mucinous Carcinoma islands of tumor cells' floating in a sea of mucin. H & E (lOx); (**b**) Mucinous Carcinoma-Tumour cells floating in pools of mucin. PAS Stain (40x); (**c**) Mucinous Carcinoma-Tumour cells floating in pools of mucin.PAS Stain (40x); (**d**) **HPE** Carsino sarcoma showing pleiomorphic spindle shaped cells with occasional polygonal cells with hyperchromatic nuclei with abundant mitotic figures. H&E (40x); (**e**) **-lHC**-Cytokeratin-diffuse cytoplasmic positivity in carcinosarcoma (**1**Ox); (**f**) IHC-CD117negative in carcinosarcoma (lOx)

DISCUSSION

Mastitis-An inflammatory pathology was found in five patients, two of which were breast abscesses and three of which were chronic mastitis. When conducted by a pathologist and paired with additional workup, such as microbiologic culture correlation, fine needle aspiration of inflammatory breast lesions is a valuable tool. It aids in the patient's care and therapy, as well as the avoidance of unneeded surgery [9]. Thirty-one instances were histopathologically evaluated, with thirty of them being diagnosed as fibroadenoma and one as fibrocystic illness. Many cytologic aspects of fibroadenoma and fibrocystic disease are similar. In these circumstances, clinical correlation, the number of naked nuclei in the background (which might be abundant in Fibroadenoma), and the presence of distinctive antlers must all be taken into consideration [13-17]. Bottles et al found that stromal fragments, antler horn clusters, and prominent cellularity were the three most effective cytological indicators for distinguishing fibroadenoma from fibrocystic disease using stepwise logistic regression analysis [18]. Axillary tail of breast-Three cases of axillary tail breast were documented on cytology. In all three cases, the histopathological diagnosis was confirmed. It's vital to remember that an axillary tail of breast tissue might present as a breast tumour, and cancer can develop in this area. Phyllodes tumor—In three cases, a benign phylloides tumour was diagnosed, two of which were connected with histological diagnosis. The presence of hypercellular stromal fragments, well-delineated borders to stromal fragments, stromal nuclear atypia, isolated stromal cells with bare nuclei, and blood vessels crossing the stromal fragments are all essential

diagnostic markers. When several phylloides fragments are present, phylloidestumour 1 is preferred over fibroadenoma, according to a prior study [19]. The solely sarcomatous component led to the diagnosis of malignant phylloidestumour. Ductal epithelial hyperplasia-On cytology, one case of ductal epithelial hyperplasia was identified, and histology revealed fibroadenomatoid hyperplasia. Fibroadenomatoid hyperplasia is a well-known but uncommon benign proliferative breast lesion with fibroadenoma and fibrocystic change 20 as composite characteristics. The existence of irregular intercellular gaps within epithelial clusters, as well as the number of loose epithelial clusters, suggested a higher risk of a proliferative lesion. 12 Atypical Epithelial Hyperplasia - On cytology, one instance was found to have atypical epithelial hyperplasia. To prevent being overdiagnosed as carcinoma, lesions with aberrant cellular characteristics should be avoided, and biopsy for a histological diagnosis is recommended [20-20]. Malignant lesions - Of the 26 malignant instances reported on FNAC, seventeen patients underwent surgical excision, which matched histological diagnosis 100 percent. Fourteen cases of ductal carcinoma NOS type, as well as one each of ductal carcinoma in situ, mucinous carcinoma, medullary carcinoma, and carcinosarcoma, were identified. On FNAC, mucinous cancer was identified, which was later confirmed histopathologically.

CONCLUSION

Despite the fact that false positive and false negative results are unavoidable, fine needle aspiration in combination with clinical examination and radiographic findings provides a valuable and accurate preoperative diagnosis in the evaluation of breast lesions. As a result, the current study validates the accuracy and clinical utility of fine needle aspiration cytology in the investigation of breast cancer patients.

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ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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