Original Article

Evaluation of Fine Needle Aspiration Cytology and its correlation with histopathological findings in palpable breast lumps

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Abstract

Introduction: Fine Needle Aspiration Cytology (FNAC) is an established diagnostic procedure for breast lumps. This study was to explore scope of cytology in identification of benign and malignant lesions by comparing FNAC reports with histopathological reports.

Methods: This is a retrospective study of 2459 cases of FNAC of breast done from February 2009 to January 2018 and histopathology of 950 cases available. Cytology smears were evaluated for various cytomorphological parameters. FNAC results were compared for diagnostic concordance using histology results as the "gold standard".

Observations: The sensitivity of breast FNAC cytology in diagnosing malignancy was 96.5%, the specificity was 100% as was the predictive value of a positive test. The negative predictive value for the absence of malignancy was 98.5%. The overall test efficiency was 98.9%.

Conclusion: FNAC is a very important preliminary diagnostic tool in palpable breast lumps, and done by expert hands, the results show a high degree of correlation with the final histopathology report.

Key Words : Breast carcinoma, Fine needle aspiration cytology (FNAC), Breast, Histopathology

I N T R O D U C T I O N

Lesions of breast are predominantly confined to females. In males, breast is a rudimentary structure relatively insensitive to endocrine influences and apparently resistant to neoplastic growth. In females, on the other hand, more complex breast structure, greater breast volume and the extreme sensitivity to endocrine influences, predisposes this organ to a number of pathological conditions. Breast cancer is one of the commonest causes of death in many developed countries in middle aged women, and is becoming frequent in developing countries as well. Mortality rates from breast cancer have increased progressively during the past many decades in every country.[1] Breast lumps are common diagnostic problem clinicians. Most cases of breast lumps are benign. [2] The patients with lump are anxious until they have undergone specialist's assessment, necessary investigations and have received appropriate re-assurance and treatment.[3] The evaluation of a given patient with breast lump begins with good clinical history including age at presentation, age at marriage, child birth, parity and family history of breast carcinoma. However, history and sometimes even good clinical examination may not be able to determine whether suspicious lump is benign or malignant.[4]

Therefore, a method of definitive diagnosis for patients presenting with breast lumps at outpatient clinic is needed. Most centres offer clinical examination followed by Fine Needle Aspiration Cytology (FNAC) as routine protocol.[5, 6, 7.] Although primary goal of FNAC is to differentiate benign lesions from malignant lesions that may require more radical therapy, FNAC may also be used for nuclear grading of breast carcinoma, diagnosis of metastatic disease at distant sites following treatment of carcinoma. Aspirates from clinical inflammatory conditions can sent for microbial culture.[8] Material from FNAC may also be utilised for hormone receptor determination, kinetic studies and oncoprotein expression.[9, 10, 11]

Many times FNAC may yield equivocal or unsatisfactory results.[12,13,14] This may be due to either insufficient epithelial cells being present, or unrepresentative aspirate resulting in false negative diagnosis. Such reports limit the diagnostic accuracy of FNAC. Furthermore, repeated attempts for FNAC material may cause local complications and may alter imaging of lumps .This leads to problems for the patient and clinician. Extra time and resources are required and the patient may have to face the psychological morbidity of waiting for repeat aspiration or Tru-cut needle biopsy and/or frozen section prior to definitive treatment. Thus histopathology results still remain Gold Standard for final diagnosis of Breast lumps.[4] An important aspect of histopathology diagnosis is its reproducibility, which can be utilized by different observers or by the same observer at different times.

AIMS AND OBJECTIVES

The aims and objectives of this study were to explore scope of cytology in identification of benign and malignant lesions by comparing FNAC reports with histopathological reports, to derive conclusions about the correlation including sensitivity, specificity, positive and negative predictive values and efficiency of FNAC as compared to histopathology.

MATERIAL AND METHODS

The present study was a retrospective study conducted in the Department of Pathology, Employees State Insurance Postgraduate Institute of Medical Sciences (ESIPGIMSR) and ESI Model Hospital, Basaidarapur, New Delhi. The duration of study was from February 2009 to January 2018 .FNAC was done in 2459 breast lump cases and in 950 cases histopathology material was available. FNAC was done using standard technique. Both Geimsa and Papanicolaou stains were used. Adequate specimen was defined as aspirates containing: More than 4-6 well visualised cell groups.[15] A cell group could be acinous (cluster of at least 6 cells) or a flat sheet (no fewer than 10 cells). Slides were reviewed for the following cytomorphological features.[16, 17]

1.	Cellularity	:	High, moderate, poor
2.	Cell Arrangements	:	Tight 3D clusters, flat sheets, adenoid pattern, loose cohesive clusters, single epithelial cells.
3.	Nuclear features	:	Nuclear size, pleomorphism, nucleoli, nuclear margins, nuclear overlap, and chromatin pattern.
4.	Cytoplasm	:	Relative amount, secretory activity, inclusion.
5.	Background	:	Clean, cystic with proteinaceous material, dirty with tumor diathesis, inflammatory, bloody, myxoid, mucoid.

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6. Scattered naked nuclei
7. Myoepithelial cells
8. Apocrine cells
9. Stromal fragments

Smears were categorised as **Unsatisfactory** when no epithelial cells / less than 4 cell groups were present. Repeat aspiration /biopsy were planned for unsatisfactory cases if clinically indicated. A **Benign** diagnosis was given when there is adequate sample of epithelial cells having normal nuclear size and chromatin pattern with no evidence of malignancy. Further categorisation into specific pathological entities such as cyst, fibroadenoma or fibrocystic disease was also done after correlation with clinical / radiological findings.[18] An **Atypical** diagnosis was given when epithelial cells had focal variation in nuclear pleomorphism, increased nuclear/cytoplasmic ratio but no significant change in chromatin pattern. Although the overall pattern of aspirate is benign but, there is population of cells which show either loss of cohesion at the edges of epithelial groups. The possibility of malignancy cannot be entirely excluded.[19] The diagnosis **Suspicious of malignancy** was used for samples that showed some features of malignancy, contain epithelial cells with irregular nuclei and coarse chromatin pattern. A **Malignant** diagnosis was made when there is sufficient number (based on cellularity) of well preserved cells with marked variation in nuclear size and shape as well as irregularity of chromatin pattern and nuclear membranes. Histopathology received were processed routinely .Cytological diagnosis was compared with histological diagnosis. An accurate FNAC result was defined as one that correctly identified the mass as malignant or benign and also provided the correct subtype. For this calculation, all diagnostic FNAC results from patients who underwent a subsequent surgical excision were compared for diagnostic concordance using histology results as the "gold standard". In addition FNAC results were analyzed for ability to recognize malignancy using statistical parameters of sensitivity, specificity, positive predictive value and negative predictive value. "Unsatisfactory" FNAC cases were omitted from analysis. Further, "Atypical" and "suspicious" for malignancy cases were also excluded as non-definitive diagnosis.

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OBSERVATION AND RESULTS

Cytological smears were categorized as benign, atypical, suspicious, malignant or unsatisfactory. Majority of breast lumps were benign (84.5%) followed by malignant (10.8%), unsatisfactory (3.1%), atypical (0.8%) & suspicious (0.8%) respectively. The details of cytodiagnosis is given in Table 1.

Table 1: Distribution of FNAC diagnosis (n=2459)

Categories	**Cytologic Diagnosis**	**11-20 yrs n=570**	**21-30 yrs n=720**	**31-40 yrs n=680**	**41-50 yrs n=305**	**51-60 yrs n=66**	**61-70 yrs n=124**	**Total n=2459**
Benign n=2079 (84.5%)	Fibroadenoma	437	399	180	57	-	10	1083 (44)
	Fibroadenosis	-	10	19	-	-	-	29 (1.2)
	Fibrocystic disease	10	28	29	-	-	-	67(2.7)
	BEPD	38	76	95	28	-	-	237 (9.6)
	Benign Phyllodes	4	4	1	-	-	-	10(0.4)
	Breast Cyst	-	19	28	48	-	-	95(3.9)
	Galactocoele	-	57	9	-	-	-	66(2.7)
	Lactating adenoma	4	4	1	-	-	-	9(0.4)
	Breast Abscess	10	48	76	9	-	9	152 (6.2)
	Tubercular Mastitis	5	5	4	4	-	-	18(0.8)
	Fat Necrosis	-	19	28	38	-	-	85(3.6)
	Gynaecomastia	57	19	38	48	9	47	218 (8.9)
	CNSL	5	3	1	2	-	-	10(0.4)
Atypical n=19 (0.8%)	Atypical	-	10	-	9	-	-	19(0.8)
Suspicious n=19(0.8%)	Suspicious	-	-	9	-	-	10	19(0.8)
Malignant n=266(10.8%)	Duct Carcinoma	-	10	123	38	57	38	266(10.8)
Unsatisfactory n=76(3.1%)	Unsatisfactory		9	38	19	-	10	76(3.1)

Figure in parenthesis show percentage.

CNSL – Chronic non specific lymphadenitis; BEPD – Benign epithelial proliferative disease

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Out of these 2459 cases, we received 950 specimens for histopathological study. These 950 cases comprised our study group for cytohistologic correlation and to explore the role of cytology in evaluation of breast lumps. (Table 2), (Fig 1- 19)

Table 2: Histopathology specimen available for evaluation

Categories	**FNA cases n= 2459**	**Tissue available n=950**
Benign	2079	617
Atypical	19	19
Suspicious	19	19
Malignant	266	266
Unsatisfactory	76	29

Benign Cytodiagnosis: categorization

Fibroadenoma

Smears of fibroadenoma were cellular with monomorphic epithelial cells in cohesive clusters, monolayered sheets and 3 dimensional clusters along with stromal fragments and abundance of bipolar nuclei in the background. The cellularity was high in majority 61.5% of fibroadenomas, moderate in 34.6% cases, and poor in 3.8% of the case. Monomorphic ductal cells were seen in 80.7% cases, uniform nuclear enlargement was seen in 19.2% cases. Nuclear margins were regular in all the cases and 5.7% showed mild nuclear overlapping, all of the cases showed bland chromatin pattern. Myoepithelial cells and stromal fragments were seen in 98% cases. Apocrine cells were seen in the aspiration smears of 9.6% cases of fibroadenomas. Intracytoplasmic vacuoles were seen in 5.7 % cases showing secretory activity. The background showed blood in 50% cases,was clean in 38.4% cases; and 7.6% cases had fat and 3.8% cases had proteinaceous background .Absence of the fluid in the aspirate and the high cellularity with clusters of monomorphic ductal cells and many bipolar naked nuclei helped to distinguish these cases from fibrocystic disease.

Fibrocystic disease

In this series 1% was diagnosed as a case of fibrocystic disease .FNAC yielded fluid on aspiration and smears show small numbers of cohesive clusters of monomorphic ductal cells showing mild pleomorphism, secretory activity, apocrine cells, foamy macrophages were seen against proteinaceous background. (Table 3)

BEPD (Benign epithelial proliferative disease)

The cellularity in cases diagnosed as BEPD was moderate in 66.6 % cases and poor in 33.3% case. Smears showed small, cohesive clusters of monomorphic ductal cells, present in all the three cases arranged in small cohesive clusters and adenoid pattern with nuclei showed regular nuclear margins and bland chromatin pattern. Secretory activity (intracytoplasmic vacuoles) was seen in all the cases, these appeared as small or large cytoplasmic vacuoles. A few scattered naked nuclei were present in all

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the 3 cases and showed a bipolar arrangement . There were no stromal fragments in any of the case .Mild focal nuclear pleomorphism was seen in 33.3% cases.

The presence of low cellularity, small number of scattered naked nuclei and absence of stromal fragments were important cytologic features to distinguish these lesions from fibroadenoma in spite of all patients presenting with well defined discrete palpable lump (Table 3).

Benign phyllodes tumour

Smears showed moderate cellularity consisting of cohesive clusters of ductal epithelial cells with mild focal nuclear pleomorphism. Smears in this case resembled fibroadenoma but the stromal fragments were abundant and large and hypercellular (Fig. 4) and in the background spindled out or elongated spindle cells were seen which helped in distinguishing it from fibroadenoma (Table 3).

Gynaecomastia

The cellularity was poor in 60% and moderate 40% , arranged in small monolayered sheets .Nuclei showed regular nuclear margins and bland chromatin pattern..Scattered naked nuclei were present in all cases but were fewer in number than in fibroadenomas . Gynaecomastia in contrast to fibroadenoma showed poorer cellularity and few naked nuclei. Histology study confirmed the diagnosis in all cases.

Lactating adenoma

The cases of lactating adenoma showed high cellularity with poorly cohesive clusters of monomorphic ductal cells along with cells arranged in adenoid pattern showing prominent intracytoplasmic vacuole some of the cells were also lying singly. Occasional naked nuclei and apocrine cells were seen. Nuclei were round, central, larger than the usual ductal cells, and had distinct small nucleoli against a background of abundant lipoidal and proteinaceous background (Table 3).

Table 3: Summary of cytomorphologic findings for benign lesions

Cytologic Criteria	**Fibroadenoma**	**BEPD**	**Benign Phyllodes**	**Gynaeco-Mastia**	**Lactating Adenoma**
Cellularity	High-moderate	Moderate-Low	Moderate	Poor-moderate	High
Cell arrangement	3D,ML, adenoid	Small 3D adenoid	Adenoid	Monolayer	Adenoid
Naked nuclei(Bipolar)	Present to abundant	Few	Abundant	Few	Absent
NE/NP	Occasional	Occasional	Seen	Seen	Prominent
Nucleoli	Absent	Absent	Absent, indistinct	Absent	Seen
Nuclear overlap	Absent –mild	Not seen	Not seen	Not seen	Not seen
Nuclear margin	Regular	Regular	Regular	Regular	Regular
Chromatin	Bland	Bland	Bland	Bland	Vesicular

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pattern					
Myoepithelial cells	Prominent	Seen	Seen	Seen	Few
Single epithelial cells	None- few	None	Not seen	Not seen	Many
Apocrine cells	Occasional	Seen	Not seen	Not seen	Seen
Secretory activity	Occasional	Fair no.	Not seen	Not seen	Seen
Stromal fragments	Present to abundant	Absent	Abundant	Present	Absent
Background	Blood , clean,fat	Clean,fat	Clean	Clean,fat	proteinaceous fat

NE/NP- Nuclear enlargement/Nuclear pleomorphism.

Breast abscess

Smears showed poorly cohesive clusters of benign bimodal population of cells, regenerative epithelial cells, against an inflammatory background comprising mainly of polymorphonuclear cells.

Tubercular mastitis

These cases showed poorly cohesive clusters of benign bimodal population of cells, degenerative epithelial cells, against inflammatory background comprising mainly of histiocytes, epithelioid cells, multinucleate giant cells and plasma cells. ZN stain for AFB was positive in all cases.

Atypical

Smears from these cases showed poor cellularity with a few epithelial cells showing mild to moderate nuclear pleomorphism, some showing prominent nucleoli, against a dirty granular background. Few foam cells, very few naked nuclei and fat spaces were also seen. Histologically two case turned out to be a case of fat necrosis.

Smears from other case showed high cellularity, small and large sheets of cohesive epithelial cells, few single cells .Nuclear atypia was absent or mild, however focal nuclear overlapping was seen. Few naked bipolar nuclei and myoepithelial nuclei, secretory activity was seen. Histologically these turned out to be carcinoma.

Suspicious

Smears from the cases showed highly cellularity with cells arranged in cohesive and loose cohesive clusters, few epithelial cells lying singly showing moderate nuclear pleomorphism, irregular nuclear margins and clumped chromatin. However background also showed many diagnostic clues that favoured a benign condition. These included a few bipolar cells, foam cells, apocrine metaplasia, myoepithelial cells which detained from giving a frank malignant diagnosis. Histologically these cases turned out to be carcinoma.

Unsatisfactory

Cases which yielded inadequate material for cytologic evaluation inspite of repeated aspirations were categorised as unsatisfactory. As there was a definite lump an open biopsy was advised to reach to definite diagnosis. These subsequently proved to be malignant (Infiltrating lobular carcinoma) ,

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fibroadenoma with extensive fibrosis or fibroadenoma with hyaline change respectively. The reason for inadequate material for cytodiagnosis was extensive desmoplastic reaction.

Malignant Cytodiagnosis: categorization

In 266 cytological malignant lesions diagnosed as carcinoma, histologic material was available for study. Smears in these cases showed high cellularity in 89.2% cases and the cellularity was moderate in 10.8%cases. Cells were arranged in 3 dimensional loose cohesive clusters, sheets and lying singly showing nuclear pleomorphism , prominent nucleoli and brisk mitotic activity. Secretory activity was seen in 10.8% cases. Myoepithelial cells were seen in 7.1% cases and stromal fragment in 17.8% cases. Naked nuclei were seen in only 3.6% case. Majority of cases showed blood in the background followed by necrosis, blood admixed with necrosis. Few of the smears revealed epithelial cell clusters being impinged by fat spaces.

Cytologic/Histologic Correlation

The cytological diagnosis was correlated with broad histologic diagnosis which is tabulated as below in Table 4.

Table4: Cytological/Histologic Diagnosis Correlation

FNAC		**HISTOLOGY**		
Diagnosis	No. of Cases	Diagnosis	No. of Cases	Correlation (%)
Benign				
Fibroadenoma	494	Fibroadenoma Fibroadenomatoid hyperplasia Fibroadenoma with myxoid change. Fibroadenoma with hyaline change. Fibroadenoma with fibroadenosis Sclerosing Adenosis Benign Phyllodes Infiltrating Duct Carcinoma	361 29 28 9 38 10 9 10	97.9
BEPD	29	Fibroadenoma with marked hyalinisation Fibrocystic disease with fibrosis Fibroadenoma with fibrosis	10 10 9	100
Fibrocystic disease	9		9	100
Phyllodes	10		10	100
Gynaecomastia	47		47	100
Lactating adenoma	9		9	100
Breast abscess	10		10	100
Tubercular mastitis	9		9	100
Suspicious	19	Invasive Carcinoma .	19	100

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Atypical	19	Fat Necrosis Carcinoma.	02 17	89.5
Malignant Duct Carcinoma	266	Infiltrating Duct Carcinoma Infiltrating Lobular Carcinoma	257 9	100
Unsatisfactory	29	Infiltrating Lobular Carcinoma Fibroadenoma with extensive fibrosis Fibroadenoma with hyaline change	3 13 13	

Benign lesions had a 98.4 % correlation rate, with a 97.9% and 100% correlation for the specific diagnosis of fibroadenoma and BEPD; 10 of these cases was false negative diagnosis, corresponding to carcinoma in histologic diagnosis. All cases with specific diagnosis of Phyllodes, Gynaecomastia, Lactating adenoma, Breast abscess and Tubercular mastitis were confirmed in histologic diagnosis. There was an overall 100% agreement for the diagnosis of malignancy. However when a specific type of carcinoma was diagnosed on FNAC, it was histologically confirmed in 96.4% cases.

The cytological suspicious diagnoses were evaluated histologically, and confirmed as breast carcinoma. Cytological atypical diagnosis was evaluated histologically, all of these wereconfirmed as breast carcinoma except 2 which turned out to be a case of fat necrosis.

Of Unsatisfactory FNAC samples with no diagnosis on FNAC specimens, 3 were infiltrating lobular carcinoma as proved by negative E Cadherin immunostain .Other cases were diagnosed as fibroadenoma with extensive fibrosis and fibroadenoma with hyaline change.

In total, 93% of cases in this study with a subsequent tissue diagnosis had a definitive FNAC cytologic diagnosis of benign or malignant. The cytohistologic correlation of 950 cases is summarized in Table 5.

Table 5: Cytologic / Histopathological correlation

Cytodiagnosis		**Histologic Diagnosis**	
		Benign	**Malignant**
Benign	n= 617	607	10
Atypical	n=19	02	17
Suspicious	n=19	0	19
Malignant	n=266	0	266
Unsatisfactory	n=29	26	03

Statistical analysis

As shown in Table 6, 873 cases were used for the evaluation of the statistical test parameters i.e. those cases for which a definitive cytologic diagnosis (benign or malignant) was given. In this study, “Atypical” and “Suspicious” cases were excluded as non definitive diagnosis. On tissue analysis, 75%

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of these cases proved to be malignant. Including these lesions with either benign or malignant cases would reduce the usefulness of this analysis of the cytologic diagnosis. In the present analysis, cytological smears reported as unsatisfactory for diagnosis were also not included. These "unsatisfactory" smears were likely to be malignant or benign and putting them into a single diagnostic category automatically presents a false picture.

Table 6: Statistical analysis of FNA diagnosis

	No. of cases
Cases with tissue study	950
Case with definitive cytodiagnosis (Benign or Malignant)	873
True Positive	265
False Positive	0
True Negative	598
False Negative	10

The sensitivity of breast FNAC cytology in diagnosing malignancy was 96.5%. The specificity of breast FNAC cytologic diagnosis of malignancy was 100% as was the predictive value of a positive test. The negative predictive value for the absence of malignancy was 98.5%. The overall test efficiency was 98.9%, as shown below in Table 7.

Table 19: Performance and Predictive Values of FNA diagnosis

Value	**Percentage %**
Sensitivity	96.4
Specificity	100
Positive Predictive Value	100
Negative Predictive Value	98.4
Efficiency	98.9

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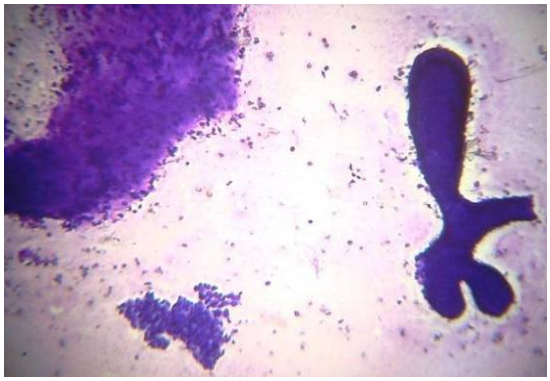

Figure 1: **Fibroadenoma showing cohesive ductal epithelial cells arranged in "staghorn" configuration, stromal fragments, and naked nuclei (aspiration cytology, Giemsa stain, 100x)**

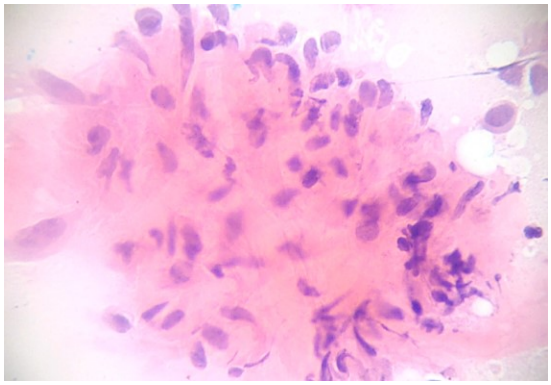

Figure 2: **Phyllodes tumour showing cellular stromal fragment with spindle shaped cells (aspiration cytology, Papanicolaou stain, 400x**

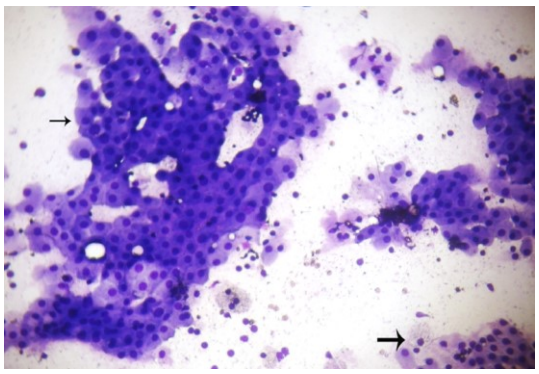

Figure 3: **Cyst aspirate showing sheets of apocrine cells, foamy macrophages and proteinaceous background (aspiration cytology, Giemsa stain, 100x)**

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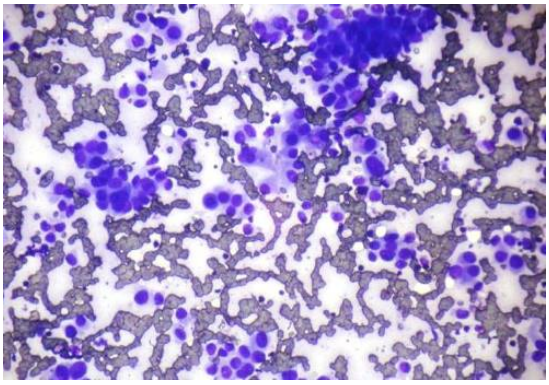

Figure 4: **Duct carcinoma showing dyscohesive clusters and single malignant epithelial cells, mild nuclear enlargement and atypia and absence of bipolar nuclei (aspiration cytology, Giemsa stain, 100x)**

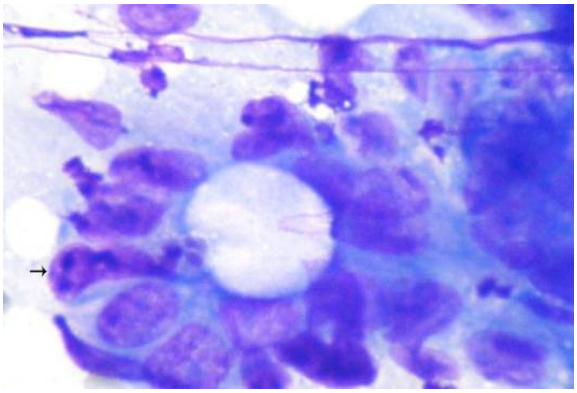

Figure 5: **Duct carcinoma showing pleomorphic cells arranged in adenoid pattern with coarse clumped chromatin and prominent nucleoli (aspiration cytology, Giemsa stain, 400x)**

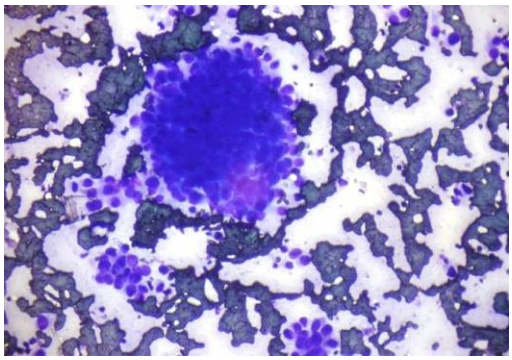

Figure 6: Duct carcinoma showing "rosette" formation (aspiration cytology, Giemsa stain, 100x)

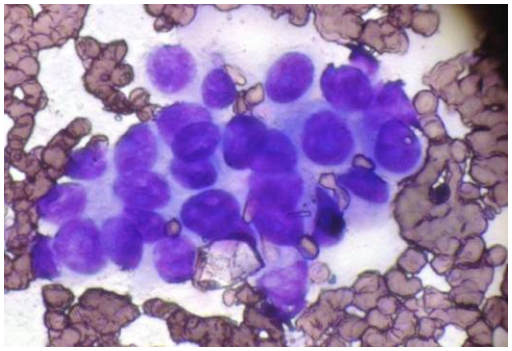

Figure 7: Duct carcinoma showing nuclear overlapping (aspiration cytology, Giemsa stain, 400x)

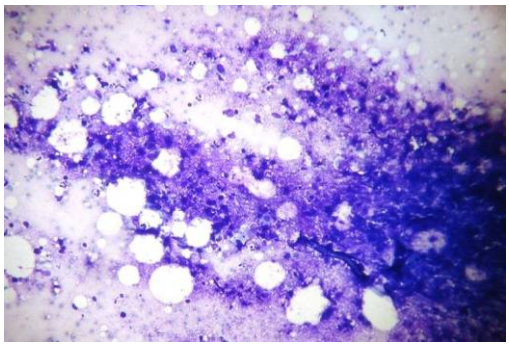

Figure 8: Duct carcinoma showing necrosis (aspiration cytology, Giemsa stain, 100x)

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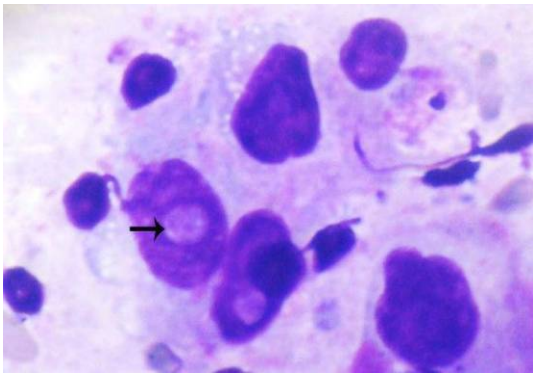

Figure 9: **Duct carcinoma showing nuclear pleomorphism, irregular nuclear margins, coarse clumped chromatin, macronucleoli (arrow), & cytoplasmic vacuolations (aspiration cytology, Giemsa, 1000x)**

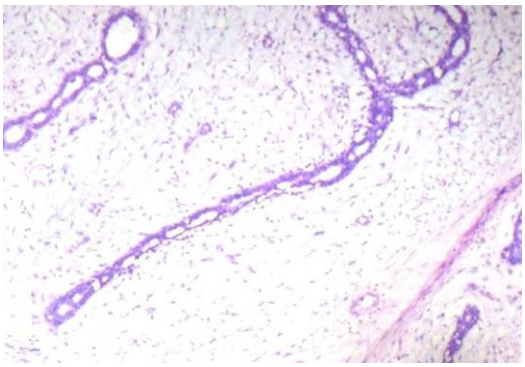

Figure 10: **Fibroadenoma showing intracanalicular pattern (HPE, H&E, 100x)**

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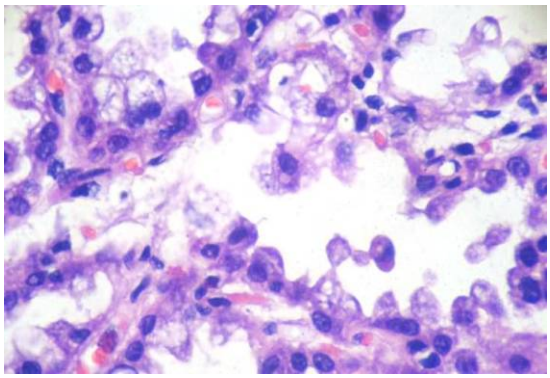

Figure 11: Lactating adenoma showing marked cytoplasmic vacuolations & hob nailing (HPE, H&E, 400x)

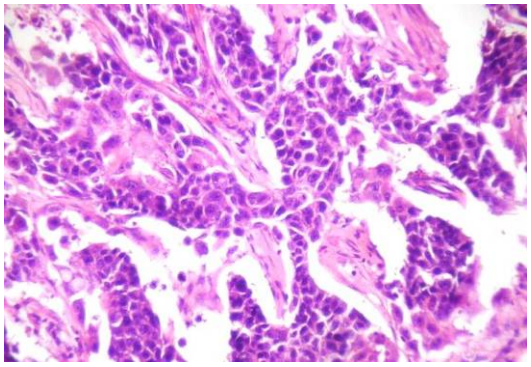

Figure 12: Infiltrating duct carcinoma showing malignant cells arranged in sheets and trabeculaes infiltrating stroma (HPE, H&E, 400x)

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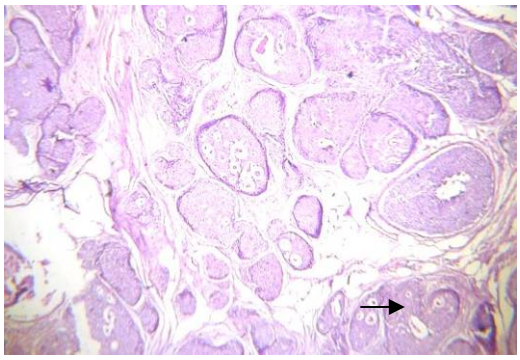

- **Figure 13: Infiltrating duct carcinoma showing adenoid cystic pattern (HPE, H&E, 100x)**

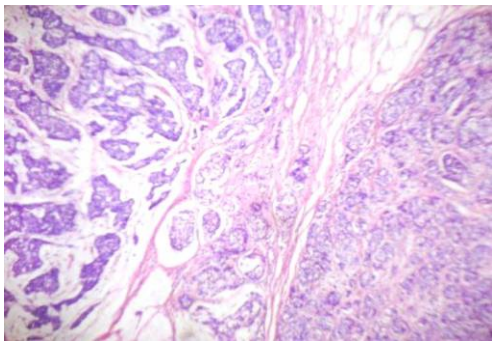

Figure 14: Mixed infiltrating duct carcinoma and lobular carcinoma (HPE, H&E, 100x)

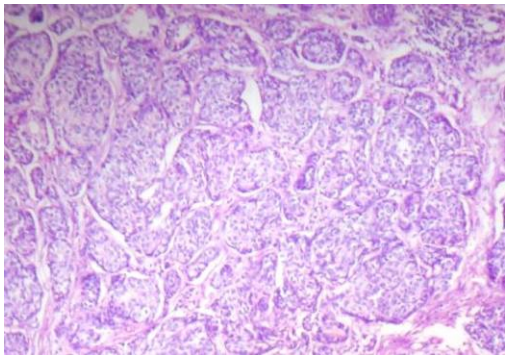

Figure 15: Lobular carcinoma in situ (HPE, H&E, 100x)

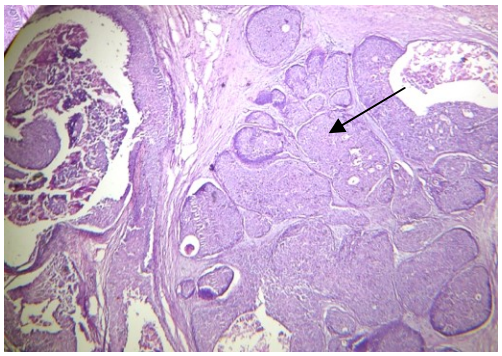

Figure 16: Duct carcinoma showing focal comedo pattern (arrow) (HPE, H&E, 100x)

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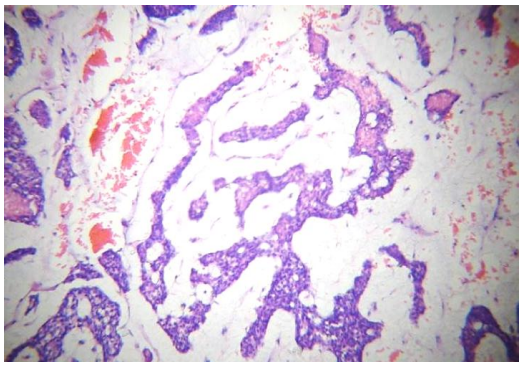

Figure 17: Infiltrating duct carcinoma showing tumour islands floating in sea of mucin (HPE, H&E, 100x)

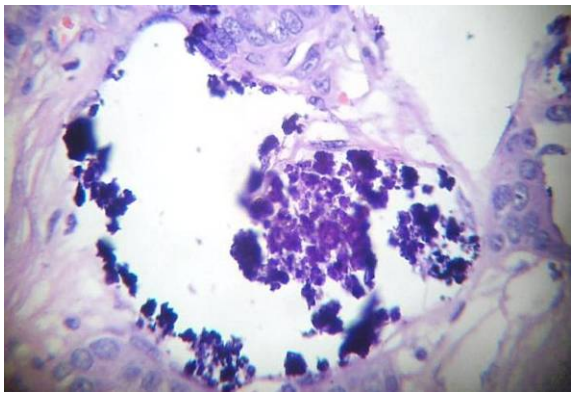

Figure 18: Intraductal calcification in ductal carcinoma (HPE, H&E, 400x)

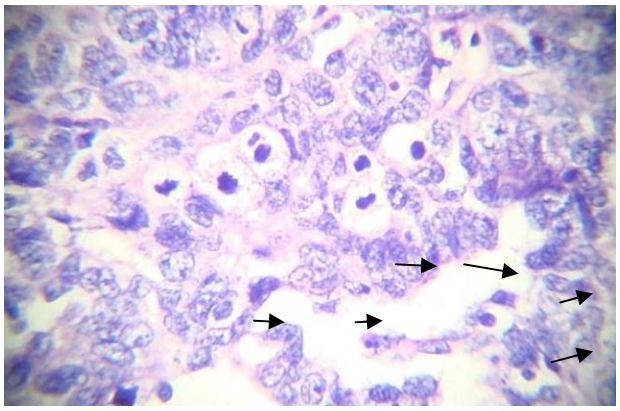

Figure 19: Infiltrating duct carcinoma showing brisk mitotic activity (arrows) (HPE, H&E, 400x)

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DISCUSSION

FNAC diagnosis were broadly categorised as benign, malignant, atypical, suspicious and unsatisfactory. In this study of 950 cases, cytological findings were compared with the histological diagnosis of each lesion.In this series 494 cases were diagnosed as fibroadenomas out of which 484 (97.9%) cases proved to be benign. The cytomorphological features of fibroadenomas in this series, compared well with those of Linsk et al[20] in whose study cellularity was good in 67.6% and moderate in 11.9% and poor in 20.5%. Stromal fragments were present in all cases. Naked nuclei were abundant in 28.6% of fibroadenomas. 9

Phyllodes tumour were classified as fibroadenoma in cytology. This cases showed moderately cellular smears predominantly arranged in monolayered sheets, mild pleomorphism of ductal cells showing bland nuclear features. A few stromal fragments and naked nuclei were also seen which led to a cytodiagnosis of fibroadenoma. In this case, the classical clinical picture of a large rapidly growing tumour pushing and stretching the skin and showing prominent vessels was not seen. Histologically, part of the tumour had features that had to classify as focal phyllodes tumour. Tissue sections in this case showed a focal area of increased stromal cellularity having a mitotic count of 2 per 10 high power fields of an otherwise usual fibroadenoma. Nadia,[21] also observed that the cytologic smears from fibroadenoma share many similarities with phyllodes tumour including high cellularity, two cell types (epithelial and bipolar) and stromal fragments. However, the stromal cells (naked bipolar nuclei) of fibroadenoma differ from that of phyllodes tumour in that they are very uniform, without undue pleomorphism. Atypia and pleomorphism of bipolar nuclei should arouse suspicion for a phyllodes tumour. Moreover, stromal fragments in phylloides tumour are often abundant, large and hypercellular.

10 of the cases which was given a benign cytodiagnosis of fibroadenoma proved to be malignant on histology. Dziura et al,[22] in their study observed that breast lesions often present with both benign and malignant change in the same mass. It is often possible to identify several distinct cell populations on a smear which correlate morphologically with as many different ductal lesions on histological sections taken from the same area. The fact that two or more ductal lesions can and do yield cells to the same specimen means that caution must be exercised when equating characteristics of one group of cells on a smear with those of a group of cells elsewhere in the slide in order to arrive at the diagnosis. Ideally each group should be evaluated separately. Malignant change in the epithelial component of fibroadenoma is thought to be infrequent.[23,24] Benign epithelial proliferative disease (BEPD)

is a broad term used cytologically to define benign proliferations that do not fall into any of the clinic cytological recognisable benign lesions. In this study 29 cases were diagnosed as BEPD cytologically, which proved to be fibroadenoma with marked stromal hyalinisation, fibrocystic disease with fibrosis or fibroadenoma with fibrosis.In study by Jayaram,[8] all the 7 .7% benign proliferative lesions had benign features even on histology thereby showing a 100% correlation rate.

Gynaecomastia was the most common reported benign lesion in male breast. The role of fine needle aspiration cytology in male breast lesions has been reported in literature and is as reliable as in female breast.[25]

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In this study,266 cytologically lesions were diagnosed as carcinoma. The most common histopathological diagnosis found in malignant lesions was infiltrating duct carcinoma found in 257 cases and remaining turned out to be invasive lobular carcinoma confirmed with negative E Cadherin immunostain.

In this series all the cases which were given a cytodiagnosis of "suspicious for malignancy" proved to be malignant on histodiagnosis. Dziura et al [22] analysed the data on cytological features that are extremely useful in discriminating between benign and malignant ductal change. Large nuclei, marked nuclear pleomorphism and presence of macronucleoli are changes which are specific to malignant ductal lesions. However, the absence of any or all of them does not mean that specimen is benign. Chromatin clumping was found to be more sensitive in diagnosing the malignancy than the above three changes. The authors also observed, that the degree of nuclear overlap was most consistently found in ductal breast lesions and was the only criterion that could be applied reliably in every case studied. The value of nuclear overlap as a diagnostic feature is illustrated well by the one case of intraductal carcinoma and one case of infiltrating duct carcinoma which were negative for all the features studied except marked nuclear overlap.

19 of the cases in this series were given a "atypical" diagnosis on cytology.2 of the cases proved to be a case of fat necrosis and others, infiltrating carcinoma. In a study done by Dominguez et al,[26] authors observed that fat necrosis is a well recognized diagnostic pitfall in FNAC breast diagnosis.

The rate of unsatisfactory aspirates in this series was 3%. Some of the contributing factors for unsatisfactory smears were intrinsic properties of tissue mass.(sclerosis, necrosis, fibrosis, cell type), difference in aspiration techniques and lack of needle guidance techniques for small lesions. The overall mean rate of unsatisfactory specimens in the study done by Dominguez et al[26] was 10.15%.

STATISTICAL ANALYSIS:

The sensitivity of breast FNAC in diagnosing malignancy was 96.5%. The specificity of breast FNAC diagnosis of malignancy was 100% as was the predictive value of a positive test. The negative predictive value for the absence of malignancy was 98.5%. The overall test efficiency was 98.9%. These data for breast FNAC diagnosis in the literature shows a broad range from 66-100% with a specificity of 82-99 %[7].

CONCLUSION

FNAC is a very important preliminary diagnostic tool in palpable breast lumps, and done by expert hands, the results show a high degree of correlation with the final histopathology report.

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