



Original Research Article

FNAC as preoperative diagnostic tool for neoplastic and non-neoplastic breast lesions with special reference to IAC standardised reporting in Coastal population - A teaching hospital experience

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ABSTRACT

Background: Breast cancer is steadily increasing worldwide. This study is based on application of recently proposed International Academy of cytology (IAC) Yokohama categorisation system of Breast cytology from C1 to C5. (C1-Insufficient material, C2-Benign, C3- Atypical, C4-Suspicious & C5-Malignant). We aim to categorize the breast lesions based on the above-mentioned categorization scheme (IAC, Yokohama 2016) along with histopathological correlation (wherever possible).

Materials and Methods: This was a retrospective observational study conducted from January 2018 to December 2021 in the Department of Pathology of a tertiary care hospital involving coastal population. Ethical clearance was taken from institutional review committee. All patients with palpable breast lumps who had undergone FNAC were included in the study. Patient details and data were collected from the case records maintained in Department of Pathology. All quantitative parameters were described through descriptive statistics. Total scores were computed for all the risk factors. Sensitivity, specificity, Positive Predictive Value, Negative Predictive Value calculated. Risk of malignancy (ROM) was calculated for each category.

Results: A total 200 patients, with age group ranging from 17 - 67 years with breast lesions were included in the study. C1 lesions were found in 5 cases, C2 in 152 cases, C3 in 11 cases, C4 in 4 cases, and C5 in 28 cases. Cytohistological correlation obtained in 94 cases with concordance noted in 89 cases and discordance in 5 cases.

Conclusions: Breast FNAC cytology categorization according to IAC Yokohama system increases accuracy of diagnosis and helps clinician in appropriate patient management.

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1. Introduction

Breast cancer, with a steadily increasing occurrence worldwide has posed to be major global burden, a public health concern.^{1,2} Lesions of the breast constitute a significant proportion of cases, in both developed and developing countries. Breast lesions can be benign or malignant, all benign lesions do not progress to malignancy.

With its high accuracy, sensitivity, and specificity, Fine needle aspiration cytology (FNAC) has become a very valuable tool in assessment of breast masses preoperatively. It is necessary to evaluate benign breast lesions from malignant lesion, before initiating any definitive treatment. Even though the vast majority of breast lesions eventually end up to be benign, patient has a high degree of anxiety associated with underlying fear of breast malignancy.^{3,4} Hence, before going for a definitive surgery, one of

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the current clinical approaches is to get cytopathologic evaluation of palpable breast masses. Evaluation of breast lump involves triple breast assessment after collecting detailed history, i.e., clinical breast examination, imaging modalities, FNAC and tissue diagnosis. IAC has established a comprehensive and standardized approach to categorize FNAC of breast lesions into C1-C5.⁵ The International academy of cytology (IAC) in 2016 has categorized breast lesions in five categories, i.e., insufficient material as Category I, benign as Category II, atypical, probably benign as Category III, suspicious, probably in situ or invasive carcinoma as Category IV and malignant as Category V.⁵ To maintain an improved FNAC practices and provides an excellent ground for quality assurance measures across various institutions, standardized reporting system is a requisite. It leads to improved breast health care and quality of research, by enhancing the quality, clarity and consistency of reports between centres both at national and international levels.⁶ As a result, in the era of neo-adjuvant treatment, for prognostication, grading of breast cancer should be included in FNAC reports. On extensive literature search, we came across only few authors who have studied breast lesions as per IAC standardized categories, among the various studies on spectrum of breast lesions.

With these knowledge gaps in mind, this study was conducted to evaluate the spectrum of breast lesions assessed by FNAC examination over a four-year period.

2. Material and Methods

In the present retrospective study, a total of 200 FNAC cytology smears from department of Pathology, KRIMS Karwar were studied from January 2018 to December 2021. The aim of present study was categorization of breast lesions based on the standardized reporting system proposed by international academy of cytologists (IAC) in 2016. Evaluation of diagnostic accuracy, sensitivity and specificity of FNAC in diagnosing breast lesions and cyto-histopathological correlation (wherever possible) was done. FNAC was done by using 10 cc syringes with 22-23G needle under all aseptic precautions. Air dried smears were stained with Leishman stain and wet smears were stained with PAP stain and H and E. H and E was done for Histopathology.

All patients with palpable breast lumps who had undergone FNAC procedure (comprising of blind and image guided) were included in the study. Patient data and all the details were collected from the case records, requisition forms and files maintained in Department of Pathology. Cytological and histopathological (wherever available) findings were noted and correlated. After data collection, data was anonymized. Entire data collected has been kept confidential throughout the study and publication.

Ethical clearance was obtained from Institutional Ethics Committee of Karwar Institute of Medical Sciences, Karwar(IEC/KRIMS/O/05/2022 dated 11/03/2022).

All quantitative parameters were described through descriptive statistics such as mean and standard deviation. The scores were assigned to various risk factors based on the probability of the occurrence of event. The total scores were computed for all the risk factors. Sensitivity (true positive rate), specificity (test result will be negative when the disease is not present), Positive Predictive Value (probability that the disease is present), Negative Predictive Value (disease is not present when the test is negative) of the scoring system were estimated. Wherever Histopathological follow up was available, by dividing number of malignant cases by total number of cases in each category, Calculation of Risk of Malignancy was done.

3. Results

We had a wide age group patient ranging from 17 years to 67 years (Table 1). Most of the cases (55.5%) were in age group of 3rd and 4th decade, with a predominance of left sided breast lesions 122(61%) (Table 2). Major symptom associated with breast lump was pain, in 63 cases followed by discharge in 34 cases (Table 3). Most common clinical diagnosis was fibroadenoma breast (132 cases) followed by Carcinoma breast(33 cases) and Fibrocystic disease (19 cases) and least being phyllodes (1 case only).

Out of the total 200 cases, the final cytological report was given as per the IAC coding system and categorised from C1 to C5 (Table 5). Among C2 lesions, 62.5% (95) cases were fibroadenoma(Figure 1) followed by 15.13% (23) cases of benign breast disease, inflammatory lesion 9.2% (14) cases, fibrocystic disease in 7.24% (11) cases, galactoceles 1.32% (02) cases, and mastitis 3.29% (05) cases, Fat necrosis 0.66% (1) case, lactational adenoma 0.66% (1) case. C3 lesion in our study included 08(72.73%) cases of fibroadenoma with atypia, 01 (9.09%) benign phyllodes tumour, and 02(18.18%)papillary neoplasm cases. 4 cases of suspicious for duct carcinoma included in C4 lesions(Table 2). C5 lesions being the second most common entity, i.e., 28 cases (14%) in our study were all ductal carcinoma (Table 3).

Follow-up was available in 94 cases (Table 6) which included 1 case of benign breast lesion which was C1 (insufficient material) in cytology. Among the C2 lesions, follow-up was available in 66 cases, all were benign (fibroadenoma 52 cases, followed by benign breast disease 07 cases, FA with fibrocystic disease included 03 case, inflammatory lesion 01 cases, granulomatous mastitis 01 cases, galactocoele 1 cases,). C3 (Atypical probably benign) lesions 9 out of 11 cases, histopathology follow-up was available (1 case of fibroadenoma and 3 cases turned out to be Intraductal Carcinoma, 02 cases of fibroadenoma with atypia, 1 case of benign phyllodes tumour, 02 case of duct papilloma,). On reviewing the C3 follow up cases Cytology slides did not show much significant atypia among ductal epithelial cells. These cases were placed

in C3 due to the presence of papillary fronds without nuclear atypia, lack of squamous metaplasia, spindle cells or stromal atypia along with lumps being greater than 10 cm and being found in younger age group. In C4 lesions, histopathology follow-up was available for 03 cases (03 cases of duct carcinoma)(Table 4). On reviewing of C4 cases cytohistological discordance was noted due to limited number of atypical cells, nonrepresentative biopsy, radiological suspicion and deep-seated lesion. Out of C5 (28 cases) 15 lesions had follow-up, all were malignant.

Table 1: Distribution of cases according to age

Age	Number	Percentage
<21	20	10%
21-30	52	26%
31-40	59	29.5%
41-50	40	20%
51-60	21	10.5%
>60	08	04%

Table 2: Distribution of cases according to laterality

Later ality	Number	Percentage
Left	122	61%
Right	68	34%
Bilateral	10	05%

Table 3: Clinical presentation of study participants

Clinical presentation	Number	Percentage
Lump	200	100%
Discharge	34	17%
Pain	63	31.5%
Ulcer	0	0%

Table 4: Distribution of cases according to clinical diagnosis.

Clinical Diagnosis	Number	Percentage
Fibroadenoma	132	66%
Fibrocystic disease	19	9.5%
Mastitis	06	03%
Lactational Changes	04	02%
Cyst	05	2.5%
Phyllodes	01	0.5%
Carcinoma	33	16.5%

4. Discussion

Breast diseases are the most common diseases in females. In relation to menstruation, pregnancy or menopause, from puberty till death, there occurs various physical and physiological alterations in breast tissue. Martin and Ellis, first introduced Fine needle aspiration cytology, in the first half of twentieth century and ever since then it has been

Table 5: Distribution of cases according to the proposed IAC Yokohama system for reporting Breast cytology.

Categories	Number of cases	Percent
Insufficient	5	2.50%
Benign	152	76%
Atypical probably benign	11	5.50%
Suspicious	04	02%
Malignant	28	14%

Table 6: Cytology and histopathology correlation.

Cytology cases	Benign histology	Malignant histology	Total
Insufficient	1	0	1
Benign	66	0	66
Atypical probably benign	06	03	09
Suspicious	0	03	03
Malignant	0	15	15
Total	73	21	94

Table 7: Risk of malignancy of the different diagnostic categories

Categories	Risk of malignancy
Insufficient	0%
Benign	0%
Atypical probably benign	33%
Suspicious	100%
Malignant	100%

Table 8: Risk of malignancy in our study and compared with other previous studies

Categories	Montezuma Det al ⁷	Poornima V Kamatkar et al ⁸	Present study
Insufficient	4.8%	0%	0%
Benign	1.4%	4%	0%
Atypical probably benign	13%	66%	33%
Suspicious	97.1%	83%	100%
Malignant	100%	99%	100%

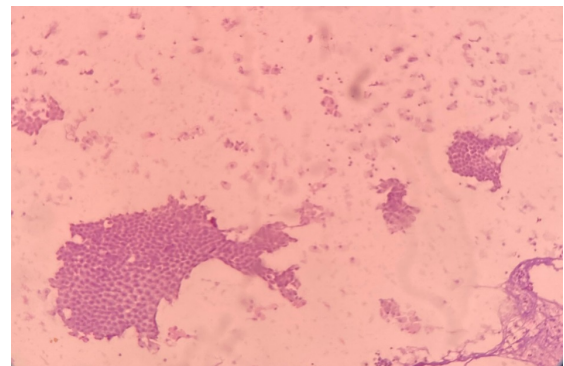


Figure 1: FNAC smears of breast showing stag horn pattern of benign ductal epithelial cells – C2 benign -fibroadenoma

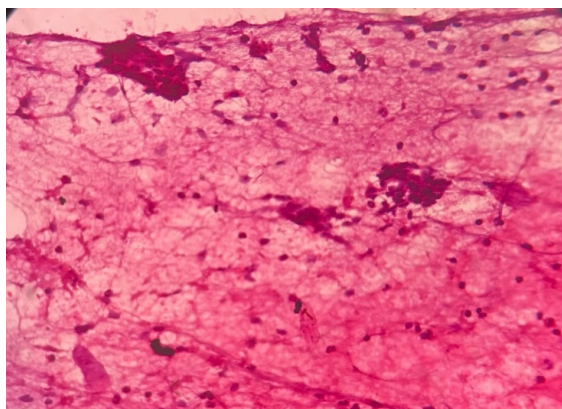


Figure 2: FNAC smears showing scantily cellular cells in cohesive sheets, moderate atypia, and prominent nucleoli (H & E ×40)-C4, suspicious.

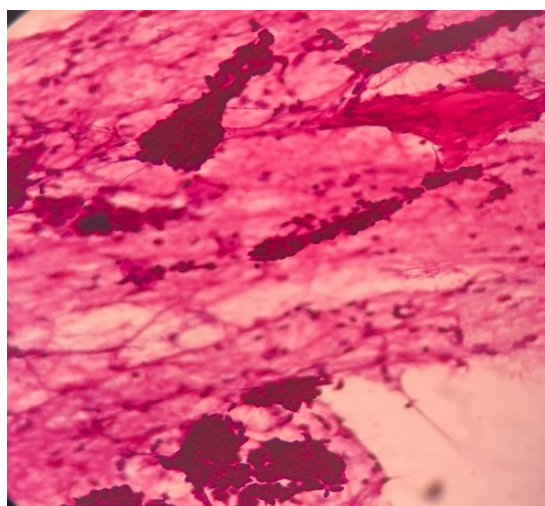


Figure 3: FNAC smear exhibiting dispersed single tumour cells, distinct atypia, large nucleoli, and background necrosis (H&E×40)-C5, Malignant

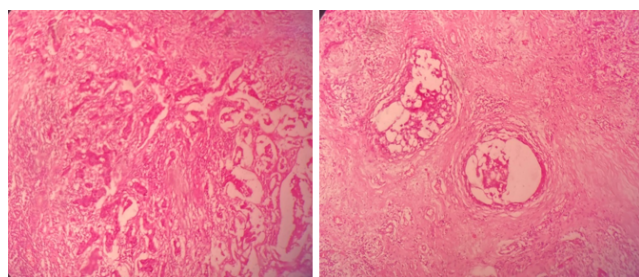


Figure 4: Histopathology section showing features of infiltrating tumour cells and vascular invasion -Infiltrating ductal carcinoma (Grade II)

established as an important tool in the evaluation of breast lesions. For breast pathologies, in areas where resources are limited, FNAC has been a preferred technique of preoperative diagnosis.^{9–12} The breast lesions range from as simple as an abscess of the breast to something as ominous as cancer. The presence of a breast lump in patients, creates anxiety that it might be cancer, may cause unbearable pain and finally result in deformity. Approximately more than 50% of the female populations at some time in life seek medical advice for breast problem, making Benign Breast Disease (BBD) a very common problem.² A profound interest in benign breast lesions has been stimulated, as certain epithelial benign breast lesions have been associated with malignant transformation, in view of Carcinoma Breast being the commonest female malignancy worldwide.

Compared to more developed regions, women from less developed regions have slightly a greater number of cases.^{13,14} Triple assessment in breast lesions, helps in Accurate diagnosis of breast cancer in 99% of cases i.e., by the combination of clinical examination, mammography, and simple, cost-effective outpatient procedure i.e., fine-needle aspiration cytology (FNAC). Core needle biopsy is the preferred procedure as compared to the practice of breast FNA in developed world. On the contrary, even today, the core needle biopsy is still not practiced routinely at most of the medical centres in developing countries like India. Most breast carcinoma cases treatment starts with the first-hand diagnosis made on FNAC. FNA is preferred in comparison to core needle biopsy, in India where resources are limited. FNAC being cheaper, less invasive, sampling of different areas of the lesion in the same sitting without any additional expenses and possibility of getting results on the same day.^{15,16} Clinicians will enhance the use of FNAB cytology and core biopsy (wherever appropriate), if cytology reporting is linked to management algorithms.

Incidence in the present study, the youngest patient was 17 years and oldest patient was 67 years. In non-neoplastic lesions the ages ranged from 15 to 60 years. Cases of fibroadenoma were the commonest in 2nd to 3rd decade. Age range for carcinoma was from 30 to 67 years. There was steady rise in incidence of carcinoma in 5th decade, i.e., the perimenopausal age group. The tumours which are easily palpable on external examination, technique of FNAC has wide applicability and utility.^{17,18} Rapid onsite evaluation will minimize insufficient rates and costs to the system, by decreasing the need for repeat treatments and triaging cases for ancillary tests.¹⁹ In our study, most common clinical presentation was palpable breast lump followed by mastalgia, similar to the findings of Salzman et al²⁰ and Nkonge et al.²¹

In our study, 2.5% cases had inadequate aspirate and were placed in C1 category which was in concordance with studies done by Montezuma Det al (5.77%),⁷ Modi et al (1.36%)²² and Sudarat N (4.9%),²³ whereas Wong S et al²⁴

had a slightly higher rate (11%) of C1 cases.

Our study had 76% (152 cases) C2 lesions, majority being fibroadenoma (62.5%) followed by benign breast disease (15.13%), inflammatory lesions (9.2%), fibrocystic disease (7.24%), mastitis (3.29%), and galactocele (1.32%), fat necrosis (0.66%), lactating adenoma (0.66%). Studies done by Sunita et al²⁵ had 50% C2 lesions, with fibroadenomas being most common (48.8%) benign lesion followed by fibrocystic disease (13.3%). Similar study conducted by Bajwa et al²⁶ had 67.7% fibroadenomas followed by fibrocystic disease (16.37%).

The gray zone lesion included C3-11 (5.7%) cases and C4-04(2%) cases. Similar results were also obtained in studies done by Wong S et al,²⁴ 4.3% C3 & 2.2% C4 lesions. However, the study conducted by Sneige N²⁷ reported 10.4% C3 and 11% C4 cases, Montezuma et al had (13.74%) C3 cases and (1.57%) C4 cases.

Our study had 14 % cases of C5 category which was lower compared to the studies done by Montezuma D et al⁷ (16.7%) and higher compared to studies done by Wong S et al²⁴ (10%).

In the present study the sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were respectively 95.74%, 99.06%, 98.9%, 96.33% and 97.5%. The results are comparable with results obtained by Montezuma D et al., Poornima V Kamatkar et al., and Moschetta M et al.^{7,8,28}

In the present study, risk of malignancy (Table 7) was calculated after correlating FNAC with Histopathology and by dividing malignant cases in each category by total number of cases in each category and compared with other studies (Table 7).

5. Conclusion

We conclude that a standardized reporting system for the classification and diagnosis of breast lesions is beneficial because the risk of cancer in each category is directly associated. Breast FNAB cytology categorization according to IAC Yokohama system helps clinician in appropriate patient management.

As per the authors for better patient care and management, incorporating of this system in cytopathology reporting routinely will be of great help

6. Source of Funding

None.

7. Conflict of Interest

None.

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