Original Article

Use of IAC Yokohama reporting system for Fine Needle Aspiration Cytology of the breast lesions. Running Title: IAC reporting system for FNAC of the breast lesions.

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Abstract

Background: Palpable mass, mastalgia, and nipple discharge are some of the breast symptoms for which patients seek medical attention, and the commonest one isa breast lump. Although not all breast lesions are malignant, concern remains with the patient as well as the treating physician to rule out carcinoma.FNAC isconsidered a rapid, reliable, and safe diagnostic tool to distinguish non-neoplastic from neoplastic breast lesions.

Aim: To study various cytomorphological patterns of breast lumps by FNAC and categorize them using a standardized IAC (International Academy of Cytology) reporting system.

Method: The study was conducted in a tertiary care teaching hospital in the national capital region (NCR) for one year. After taking consent, 112 consecutive female patients presenting with a palpable breast lump were included in the study. Smears were prepared and stained with Giemsa stain and examined for cytological diagnosis. IAC Yokohama system was used for the final report standardization and categorization of cytological findings.

Results: 112 cases were included in the study, out of which3 cases (2.7%) were included in C1, 96 cases (85.7%) in C2, 3 cases (2.7%) in C3, 2 cases (1.8%) in C4, and 8 cases (7.1%) in the C5 category.

Conclusion: Our study concluded that FNAC has 100% sensitivity in diagnosing malignant breast lesions. Also, the IAC format of reporting would enhance its reproducibility and help clinicians in providing timely treatment.

Keywords: Breast lump, Fine Needle Aspiration Cytology, FNAC, IAC reporting, breast carcinoma

Introduction:

Breast carcinoma is one of the most life-threatening carcinomas in women and is the leading cause of death among women all over the world.(1)In India, the estimated mortality rate is about 12.7 per 100,000 women.(2)There are many causes for the increase in cases of breast carcinomas, some of which are due to late marriage, childbirth at a later age, a short period of breastfeeding and nulliparity or low parity, etc.(3)

Palpable mass, mastalgia, and nipple discharge are some of the breast symptoms for which patients seek medical attention, and the commonest one is a breast lump. Although not all breast lesions are malignant, concern remains with the patient as well as the treating physician to rule out carcinoma.

In recent times, accurate diagnosis of breast lesions are made in 99% of cases by the 'Triple Test,' which is a combination of clinical examination, mammography, and fine-needle aspiration cytology (FNAC).(4)Although the gold standard test for diagnosis is the histopathological examination, FNACs, especially in the hands of experienced cytopathologists, have high diagnostic accuracy, as high as 98.9%.(5)

There are many reporting systems for Breast FNACs. Currently, the IAC(International Academy of Cytology) reporting system has been gaining much relevance. A group of cytopathologists interested in breast fine needle aspiration biopsy cytology at the International Congress of Cytology in Yokohama in May 2016 discussed the use of a 3- or 5-stage coding system. This standardized reporting system includes five categories from C1 to each with a clear descriptive term for the category, a definition, a risk of malignancy, and a suggested management algorithm.(6)

C1- Insufficient material

C2 - Benign

C3 – Atypical, probably benign

C4 – Suspicious of malignancy, probably insitu or invasive carcinoma

C5 - Malignant

Materials and method:

An observational cross-sectional study was conducted at a tertiary care teaching hospital in the national capital region (NCR) for one year, from January 2021 to December 2021. The study population included 112 consecutive females of all ages presenting with a palpable breast lump. The following are the inclusion and exclusion criteria.

Inclusion criteria:

(1)All female patients with an unknown primary diagnosis of a breast mass.

Exclusion criteria:

(1)Patients with recurrent malignancy.
(2)Past or current chemo-therapeutic or prevention treatment.
(3)Male patients with breast lesions (carcinoma and gynecomastia).

After taking informed consent, the patient's socio-demographic details and clinical data regarding the site of involvement, the lesion size, the lump's laterality, duration, etc., were recorded. The patient was made to lie in the supine position. The lump was localized by palpation and cleaned with a sterile spirit swab. The swelling was fixed using the thumb and index finger of the left hand. FNAC was performed using the aspiration technique. Smears were prepared and dry, fixed, and stained with Giemsa stain. One smear was wet fixed and stained with Papanicolaou stain. Stained smears were examined under a light microscope, and cytological diagnosis was made.

In the present study standardized structured report according to International Academy of Cytologists (IAC) criteria included a brief cytological description, noting the presence or absence of key diagnostic features and a diagnostic category (insufficient material(C1), benign(C2), atypia probably benign(C3), Suspicious probably insitu or invasive carcinoma(C4), and Malignant(C5) and a specific diagnosis of the lesion wherever possible.
Histopathological correlations were done wherever possible.

Results:

A total of 112 cases were included in the study. The patients ranged from 13 to 75 years, with a median age of 30 years. 79% of the patients were married, 21% were single, 65% were parous, and 35% were nulliparous. 93% of patients were from the urban region, and the majority of them (65%) belonged to upper lower socio-economic status (*Figure 1*)

Chief complaints recorded from the patients were mass (65%), mass and pain (15%), pain(12%), pain & warmth(5%), nipple discharge(2%), nipple retraction(1%) (*Figure 2*).
The right breast was most affected (51%) than the left breast (45%) (*Figure 3*), with the upper outer quadrant being majorly involved (40%) (*Table 1*).
Out of 112 cases, cytological diagnosis made according to IAC criteria were C1 in 3 cases(2.7%), C2 in 96 cases(85.7%), C3 in 3 cases(2.7%), C4 in 2 cases(1.8%), C5 in 8 cases(7.1%) (*Table 2*).Majority of the cases belonged to C2 category ie. Benign lesions.
The lesions which belonged to C2 included Fibroadenoma, Benign breast lesion, benign epithelial proliferative breast disease, breast abscess, breast mastitis, Fibrocystic disease, Galactocele, Granulomatous mastitis, and Inflammatory breast disease. C3 included hormone-related changes with atypia and proliferative disease with atypia. C4 included suspicious favoring malignancy, and C5 included malignant carcinoma *(Figure 4*).
Eleven cases were available for histopathological correlation. Hence comparing with cytological diagnosis, the following discrepancies arrived. Two cases of fibroadenoma in histopathology were wrongly reported as proliferative breast disease and fibrocystic disease in cytology. All malignant cases in cytology also turned out to be malignant in histopathology.
Statistical analysis showed that FNAC had 100% sensitivity and 81% positive predictive value, and when it comes to the diagnosis of malignant lesions, FNAC showed 100% sensitivity and specificity.

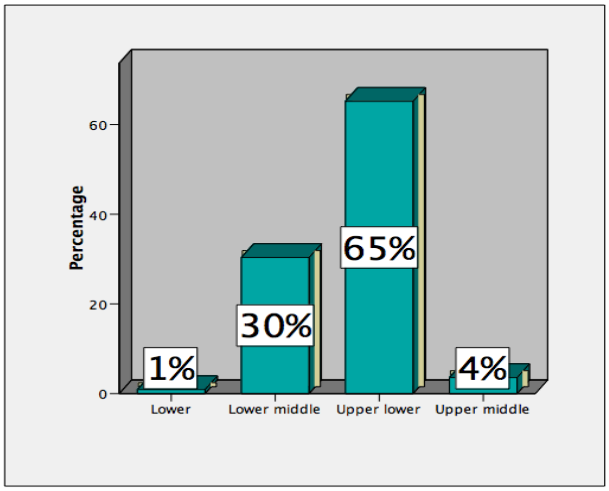

Figure 1: *Socio-economic status of patients*

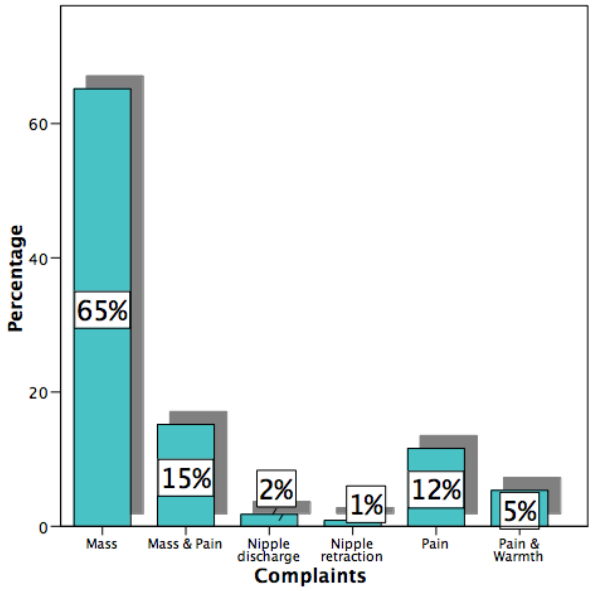

Figure 2: *Chief complaints of the patients*

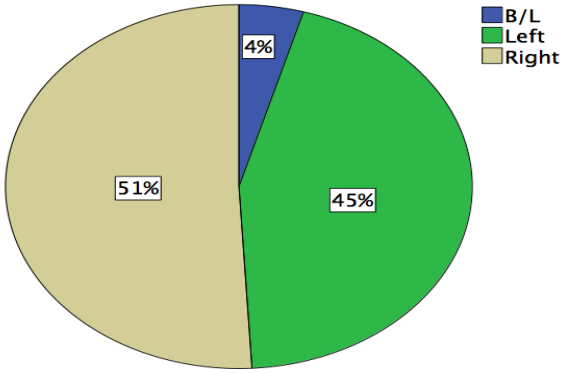

Figure 3:*Laterality of the breast lesions*

	Frequency	Percent
All quadrants	4	3.6
Lower Inner	21	18.8
Lower outer	24	21.4
Subareolar	1	.9
Upper Inner	17	15.2
Upper outer	45	40.2
Total	112	100.0

Table 1: *Anatomical distribution of the lesions*

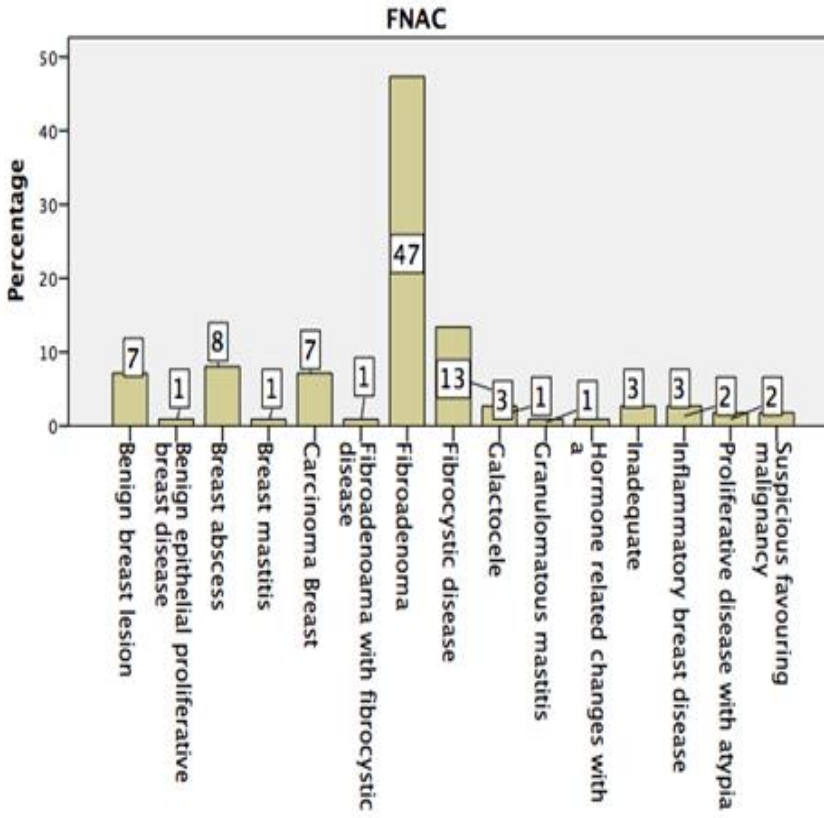

Figure 4:*Percentage distribution of various lesions diagnosed on FNAC*

	Frequency	Percent
C1	**3**	**2.7**
C2	**96**	**85.7**
C3	**3**	**2.7**
C4	**2**	**1.8**
C5	**8**	**7.1**
Total	**112**	**100.0**

Table 2: *Categorization and Frequency of various breast lesions according to IAC Yokohama reporting system.*

Discussion:

The commonest cancer among females worldwide is Breast Cancer. It has ranked as the number one cancer among females with an age-adjusted rate as high as 25.8 per 100,000 women and mortality of 12.7 per 100,000 women.(2)Hence the diagnosis of breast lesion in an early stage is of utmost importance in order to prevent mortality and morbidity which occurs most commonly due to malignant progression.

Fine needle aspiration cytology (FNAC) is a basic diagnostic technique used to investigate superficial and deep swellings. The FNAC for breast aspiration was introduced in 1960 by Franzenand Zajicek at the Karolinska Hospital in Stockholm, although it began to flourish in the year 1950s and 1960s when a group of European pathologists started studying thousands of cases each year.

Reporting of Breast Cytology had been descriptive earlier. It lacked standardization and reproducibility with no clear guidelines and standard approach for management and patient follow-up. The IAC Yokohama System defines five categories for reporting breast cytology, each with a precise descriptive term for the category, a definition, a risk of malignancy, and a suggested management algorithm. The system is based on cytomorphology and includes key diagnostic cytological criteria for each of the many lesions and tumors found in the breast. The five categories are defined as follows:

C1: INSUFFICIENT/INADEQUATE - The smears are too sparsely cellular or too poorly smeared or fixed to allow a cytomorphological diagnosis.

C2: BENIGN - Unequivocally benign cytological features, which may or may not be diagnostic of a specific benign lesion.

C3: ATYPICAL - The presence of cytological features seen predominantly in benign processes or lesions, but with the addition of some features that are uncommon in benign lesions and which may be seen in malignant lesions.

C4: SUSPICIOUS of MALIGNANCY - The presence of some cytomorphological features which are usually found in malignant lesions, but with insufficient malignant features, either in number or quality, to make a definitive diagnosis of malignancy. The type of malignancy suspected should be stated whenever possible.

C5: MALIGNANT- A malignant cytological diagnosis is an unequivocal statement that the material is malignant, and the type of malignancy identified should be stated whenever possible.

The present study utilized the standardized structured report format according to the IAC Yokohoma system. It included a brief cytological description, noting the presence or absence of key diagnostic features, a diagnostic category (C1 to C5), and a specific diagnosis of the lesion wherever possible.

The association of breast cancer in married females is higher (79%) than in unmarried females. Sinjini Sarkar et al. in 2019 published similar findings.(7)In the present study, most of the cases were benign lesions (96%) which was in concordance with the study conducted by Hemlata et al. in 2020 and Pandey et al. in 2017. This may be because most of the patients visiting our institution for breast FNAC were younger. Among the benign lesions, fibroadenoma was more common (47%), followed by fibrocystic disease (17%), which also matched with several other studies. The malignant lesions were common in females above 50 years, which was the same in the study conducted by Bhavya et al. in 2018.(8)

A standard reporting format must be practiced because there is a wide variation in reporting benign lesions. For example, in our study, benign lesions were Fibroadenoma, Benign breast lesion, fibrocystic disease, mastitis, galactocele, abscess, and inflammatory lesions. These were included under category C2 according to the International Academy of Cytologists (IAC) criteria. Hence by following a structured reporting format, the reporting standard can be made relevant and reproducible.

In our study, 2.7 % of cases were inadequate and were included in the C1 category, 85.7% cases were in the C2 category, 2.7 % cases in the C3 category, 1.8% cases included in category C4 and 7.1% cases in the C5 category. These findings were in concordance with various other studies done by David et al. (9), Sunita et al. (10), Arul et al. (11), and Hemlata et al. (6). Table 3 shows a comparison of the present study with various other studies.

Studies	**C1**	**C2**	**C3**	**C4**	**C5**
Hemlata et al (6)	1.3%	82.6%	5.7%	1.8%	8.4%
Sunita et al (10)	2.9%	50%	3.5%	6.5%	37.1%

David et al (9)	1.2%	60.9%	8.7%	3.7%	25.5%
Arul et al (11)	2.7%	62.7%	5.2%	7.8%	17%
Present study	2.7%	85.7%	2.7%	1.8%	7.1%

Table 3: *Comparison between various studies with IAC categorization*

The success of FNAC depends on a few fundamental requirements that include an experienced pathologist, adequate sampling, smearing, and staining process. Along with this, clinical and radiological information must be made available.(12)

Conclusion:

FNAC is a reliable, cost-effective, and minimally invasive procedure for diagnosing breast lesions.(8) Hence, we would like to conclude that when FNAC report is produced using a structured format like the IAC reporting system, it standardizes the report, brings uniformity in reporting and interpretation, and increases its reproducibility.
Thus it would help clinicians better manage and follow up with the patients.

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