Role of clinical examination in the evaluation of patients with breast lumps: A cytopathological study

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Abstract. The triple test is an initial approach used for the evaluation of breast lumps. The clinical and physical examination are a critical component. Various studies indicate that there is difference in the clinical examination findings of benign vs. malignant breast lumps. The aim of the present study was to evaluate the significance of differences in the clinical examination of benign and malignant breast lumps from a cytological perspective. For this purpose, 301 consecutive breast lumps examined using fine needle aspiration cytology (FNAC) cases were included in the study. The patients were divided into category C-1 to C-5 based on the International Academy of Cytology classification system for the FNAC reporting of breast lesions. The clinical examination parameters studied included the age of the patients, duration, consistency, tenderness, mobility, location in the breast and the laterality of the lump. The cases were grouped into the benign group (C1, C2 and C3) and suspicious/malignant group (C4 and C5). The median duration of the benign lumps was 4 months compared with that of the malignant lumps, which was also 4 months. The malignant lesions were more likely to be in the upper quadrant, and were also non-mobile and hard (non-tender) upon a clinical examination. There were statistically significant differences in some of the clinical features, namely in the duration of presentation, site, mobility and consistency of the breast lump among various cytological category. On the whole, the present study re-emphasizes the importance of a thorough clinical examination for the better management of patients with breast lumps.

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Introduction

Breast disease includes various benign and malignant disorders. Among the malignant lesions, carcinoma of breast is the most common type of cancer among women worldwide (1); its increasing incidence has surpassed that of cervical cancer, and it has become the most common malignancy among Indian women as well (2). According to the GLOBOCAN 2020 data, >2 million women were diagnosed with breast cancer and there 685,000 related deaths globally. The age-standardized incidence rate for breast cancer in females worldwide was shown to be 47.8 and in Asia it was 36.8 per 100,000 women (3). According to the study by Malvia *et al* (2), the age-adjusted incidence of breast cancer is as high as 41 per 100,000 women for Delhi followed by Chennai (37 per 100,000 women), Bangalore (34.4 per 100,000 women) and the Thiruvananthapuram district (33.7 per 100,000 women) in India (2). Some of the common clinical symptoms of female breast disease include palpable breast lumps, breast pain and nipple discharge (4). Therefore, one of the key challenges for the treating clinician is whether the breast lump is malignant or benign. On the other hand, patients are also mentally stressed anticipating breast cancer even though the majority of breast lesions are benign (5,6).

The evaluation of breast lumps includes a detailed clinical history, breast examination, imaging techniques and a tissue diagnosis. However, the triple test is very useful for the diagnosis of breast cancer, which includes a physical examination of the breast, mammography and fine needle aspiration (FNA) cytology (FNAC) of the breast lump (7).

Among these tests, FNAC is considered a cost-effective, minimally invasive and relatively painless procedure with rapid results. It has a good sensitivity and specificity, and is highly accurate in the diagnosis of breast carcinoma (8). Since some of the breast lesions do not require surgical intervention, the pre-operative cytological diagnosis can reduce unwanted surgeries, thus reducing the morbidity rate (9).

In order to increase the quality, clarity and reproducibility of FNA reports, the International Academy of Cytology (IAC), has developed the classification of breast lesions into the C1 to C5 category, as reported on cytology results (10), which helps not only in the proper communication between the pathologist and clinician, but is also useful in deciding upon more

effective treatment options for the management of patients with breast cancer.

A thorough clinical examination of a breast lump is the first step in the triple assessment approach, as well as for the FNA procedure. Both breasts and axillae should be examined methodically by the clinician. Although it may be tempting to bypass the physical examination due to the availability of other more targeted investigative techniques, such as mammography or ultrasonography, the findings of the physical examination are critical for the optimal diagnosis and management of breast disease (11). Previous studies have also revealed that only by combining all three assessment methods optimal sensitivity and specificity can be achieved (11,12). Thus, the present study aimed to evaluate the significant differences in the clinical examination features of benign and malignant breast lumps utilizing cytological data.

Materials and methods

Patients and examined parameters. The present study was a prospective clinicopathological study of patients who presented with breast lumps in the FNA clinic of a tertiary care Hindu Rao Hospital and NDMC Medical College. The present study was performed after obtaining approval from Institutional Ethics Committee, NDMC Medical College and Hindu Rao Hospital vide letter no. IEC/NDMC/2022/109 dated 17.06.2022. All guidelines as per the Declaration of Helsinki and good clinical practice guidelines were followed. Informed written consent from the patients for participation was also obtained.

Over a period of 1 year from October, 2022 to October, 2023, a total of 301 cases of all patients with breast lesions who had given consent for participation were included for a cytological examination. The patients who had not given written consent for participation were excluded from the study. Following proper counselling about the FNAC procedure, all related clinical features including age, the sex of the patients, side, site, size of lump, duration of symptoms, consistency of lump, tenderness and mobility of lump were noted. The patients underwent FNA sampling by an experienced cytopathologist and a smear was made by spreading the aspirate material with the aid of another clean glass slide. The smear was stained using Romanowsky stain (May Grunwald-Giemsa stain, Merck India). Absolute methanol was used for the fixation of air dried FNAC smear for 5 min at room temperature. Subsequently, the fixed smear was stained with May Grunwald stain, followed by Giemsa stain for 10 min each at room temperature. The smear was washed with tap water thoroughly and air-dried. The stained smear was mounted with DPX mountant. Subsequently, a microscopic evaluation was performed by a senior cytopathologist using a compound light microscope (Olympus Corporation). On the basis of types of obtained cells, nuclear characteristics and intracytoplasmic features of cells, a specific cytological impression was made and the lesions were categorized according to the IAC classification system for the FNAC of breast lesions reporting into categories from C1 to C5. The clinical features studied include the patients' age, sex, side of the lesion, site of the lesion, size of the lesion, duration of symptoms, consistency of the lump, tenderness and mobility of the lump. The duration of symptoms is presented in months. The size of the lesion was measured in centimeter squared (cm^2). For further statistical analysis, the C4 and C5 categories were combined and considered as the malignant group, to be compared with the benign group comprising of categories C1, C2 and C3.

Statistictal analysis. Statistical analysis was performed using Python language package V3.0 (https://www.python.org) along with Jupyter V5.0 (https://jupyter.org) as the IDE for Python language. The Mann-Whitney test, Fisher's exact test and the Kruskal-Wallis test were used to assess the association between various clinicopathological features of breast lumps and the diagnosis of the lesion. Bonferroni's correction was applied following Fisher's exact test for the multiple comparisons of the categorical data. In the case that the results of the Kruskal-Wallis test were statistically significant, Dunn's post hoc test was then performed. A P-value <0.05 was considered to indicate a statistically significant difference.

Results

Out of 301 patients with breast lumps, 296 were females and only 5 were male, with a female to male ratio of 59.2:1. The overall range of patients' age was 6 to 75 years with a mean age of 28.97 years (SD ± 12.25 years). The maximum incidence of breast lumps was found in the age group of 21-30 years (113/301 cases, 37.54%), followed by the group of 11-20 years (83/301 cases, 27.57%) and 31-40 years (51/301 cases, 16.94%). The mean age of the benign cases was 27.4 years (SD ± 10.6 years) and the mean age of the malignant cases was 50.4 years (SD ± 14.2 years). This difference in the mean age between the two groups was statistically significant (P=0.001, Mann-Whitney test, Table I).

Among all the breast lesion cases, 93.02% were benign (280 cases), as compared with 6.98% (21 cases) malignant lesions. However, all male breast lumps were benign. Furthermore, all the benign lumps were diagnosed as fibroadenoma (157 cases, 52.16%), which was the most common diagnosis followed by inflammatory lesion/mastitis/abscess (22 cases, 7.31%) (Figs. 1 and 2). The distribution of cases according to the IAC reporting system is presented in Table II.

The median duration of presentation of breast lumps for the male subjects was 2 months (range, 1-6 months), which was lower than that for the female subjects (4 months; range, 0.1-144 months). However, this difference between males and females was not statistically significant (P=0.351, Mann-Whitney test, Table III). The present study also analyzed the site of the breast lump; it was found that upper-outer quadrant (113 cases, 37.5%) was the most common site, followed by the upper-inner quadrant (73 cases, 24.2%) and sub-areolar area (55 cases, 18.27%). In terms of the side of the breast lump, right side lumps were the most common (166/301 cases, 55.15%), closely followed by left (127/301 cases, 42.19%) and bilateral (8 cases, 2.7%) lumps (Table IV).

The mean size of the benign lumps was 4.90 cm^2 (SD ± 11.18; median, 2 cm^2, ranging 0.04-117.0 cm^2) as compared with the mean size of malignant lumps, which was 13.01 cm^2 (SD ± 22.42; median 4 cm^2, ranging 0.64-100.0 cm^2). This difference was statistically significant (P=0.002, Mann-Whitney test, Table I).

Table I. Analysis of the age and tumor size of the patients.

A, Age distribution

Age group (years)	Total cases, n (%)	Benign cases, n (%)	Malignant cases, n (%)
1-10	4 (1.33)	4 (1.43)	0
11-20	83 (27.57)	83 (29.64)	0
21-30	113 (37.54)	112 (40)	1 (4.76)
31-40	51 (16.94)	47 (16.78)	4 (19.05)
41-50	35 (11.63)	26 (9.29)	9 (42.86)
51-60	9 (2.99)	7 (2.5)	2 (9.52)
61-70	3 (1.0)	0	3 (14.29)
71-80	3 (1.0)	1 (0.36)	2 (9.52)
Mean ± SD	28.97±12.25 years	27.4±10.6 years[a]	50.4±14.2 years[a]
Total	301 (100)	280 (93.02)	21 (6.98)

B, Tumor size

	Total cases (n=301)	Benign cases (n=280)	Malignant cases (n=21)
Median (range)	2.0 (0.04-117.0) cm^2	2.0 (0.04-117.0) cm^{2b}	4.0 (0.64-100.0) cm^{2b}

[a,b]Statistical analysis was performed using the Mann-Whitney test; [a]P=0.001, for age group, benign cases vs. malignant cases. [b]P=0.002, for tumor size, benign cases vs. malignant cases. Values of P<0.05 were considered to indicate statistically significant differences.

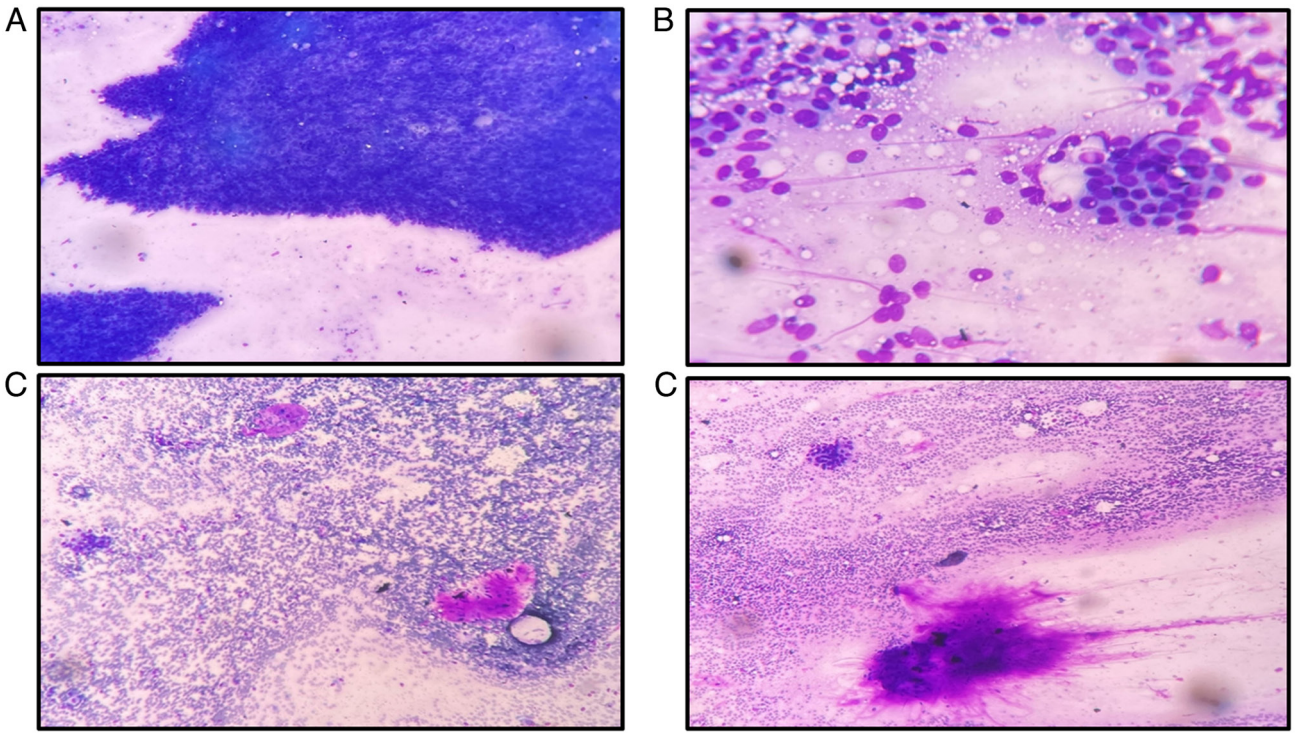


Figure 1. Photomicrograph illustrating monolayered sheet of ductal cells from a case of (A) fibroadenoma (MGG staining; magnification, x10), (B) bipolar naked nuclei (MGG staining; magnification, x40) and (C and D) pink stromal material (MGG staining; magnification, x10). MGG staining, May Grunwald-Giemsa staining.

The duration of presentation of breast lumps was also analyzed for each side. The median duration of presentation in patients with bilateral breast lumps was significantly higher (12 months; range, 0.1-120 months) compared with that in patients with right-sided breast lumps (3 months; range, 0.1-120 months; P=0.044; Dunn's test), whereas no

Table II. Distribution of breast lesions according to the IAC reporting system.

IAC	Description	Frequency	Percentage
C1	Insufficiency/unsatisfactory	59	19.6
C2	Benign	197	65.4
C3	Atypical probably benign	24	8.0
C4	Suspicious for malignancy	9	3.0
C5	Malignant	12	4.0
Total		301	100

IAC, International Academy of Cytology.

significant difference (P=0.204; Dunn's test) was found for the presentation of lumps between bilateral (12 months; range, 0.1-120 months) and left-sided lumps (6 months; range, 0.1-144 months). However, the difference in duration of presentation between right- and left-sided lumps were statistically significant (P=0.024; Dunn's test; Table III).

Moreover, the median duration of presentation was greater for patients in the C3 category (12 months; range, 0.2-84 months) than for those in the C2 and C5 categories (4 months; range, 0.1-144 months) and 7.5 months (range, 0.5-48 months), respectively (Table III).

From the analysis of the difference in duration of presentation among different IAC categories of breast lesions, overall statistically significant differences were found among various IAC categories (P=0.039, Kruskal-Wallis test). Furthermore, it was found that the difference in the duration of presentation between C1 and C3, C2 and C3, and C3 and C4 was statistically significant (P=0.006, P=0.021 and P=0.015, respectively, Dunn's test), whereas it was insignificant between the remainder of the categories of breast lesions (all P>0.05, Dunn's test, Table III). The mean duration of presentation of benign cases was 12.37 months (SD ± 21.59 months) with median 4 months, ranging 0.1-144 months as compared with the mean duration of presentation of 7.52 months (SD ± 10.38 months) with median 4 months, ranging 0.1-48 months for malignant cases; however, this difference was not statistically significant (P=0.767, Mann Whitney test). Moreover, the median duration of presentation in both benign and malignant patients was 4 months with a range of 0.1-144 and 0.1-48 months, respectively (Table III).

The percentage of non-mobile lumps in categories C2 (0/197 cases), C3 (1/24 cases) and C5 (4/12 cases) was 0, 4.2 and 33.3%, respectively. Among the categories, the difference in mobility between C1 and C5, and C2 and C5 breast lumps was statistically significant (P=0.020 and P=0.010, respectively; Fisher's exact test). However, the difference in mobility between rest of the categories was not statistically significant (all P>0.05, Fisher's exact test, Table IV).

The percentage of breast lumps with a hard, non-tender consistency in the malignant group (C4 and C5; 4/21 cases) was 19%, whereas in the benign group (C1, C2 and C3; 2/280 cases) this was about 1% only. In terms of IAC category, the percentage of hard, non-tender lumps in category C5 (3/12 cases) was 25%, whereas in C2 and C3, this was 0%. This difference in consistency only between C2 and C5 breast lumps was found to be statistically significant (P=0.010, Fisher's exact test). The difference in consistency between other remaining categories of breast lump was insignificant (all P>0.05, Fisher's exact test, Table IV).

In the present study, there was no significant difference found in laterality (side) among all the IAC category of breast lumps (P=0.852, Fisher's exact test, Table IV).

The proportions of breast lumps in the upper quadrant for categories C1 (31/59 cases), C2 (123/197 cases), C3 (14/24 cases), C4 (6/9 cases) and C5 (12/12 cases) were 52.5, 62.4, 58.3, 66.7 and 100%, respectively, whereas the proportions of lumps in quadrants other than the upper quadrant were 47.5% (28/59 cases), 37.6% (74/197 cases), 41.7% (10/24 cases), 33.3% (3/9 cases) and 0% (0/12 cases), for categories in the C1 to C5 in sequence, respectively. This difference in quadrant (site) between the C1 and C5 breast lesions was statistically significant (P=0.020, Fisher's exact test). However, this difference in quadrant was insignificant (all P>0.05, Fisher's exact test) between the remaining of the breast lesions category (Table IV).

Discussion

The incidence of breast cancer has been significantly increasing globally, which predominantly affects the health of women and has an adverse cosmetic impact in females (13). Although cytological techniques, particularly FNAC are emerging as a key diagnostic tools for the preoperative assessment of palpable breast lumps, the clinical examination of breast lumps also plays a crucial role for the evaluation of breast lumps.

In the present study, the number of female patients was higher than that of male patients, with a male to female ratio of 59.2:1, which was higher than 26:1 and 4:1, as reported by Embaye *et al* (13) and Qadri *et al*, respectively (14). Overall, the mean age of the patients was slightly lower in the present study than in the studies by Embaye *et al* (13) (mean age, 33.05 years) and Madan *et al* (15) (mean age 34.54 years).

In the present study, it was found that the maximum incidence of breast lumps occurred in the age group of 21-30 years followed by the age group of 11-20 years, which can be considered as younger age group (<30 years). Additionally, the mean age of presentation was significantly higher for patients with malignancies than for those with benign lesions. This finding is similar to that of other studies performed by Rioki *et al* (16), Madan *et al* (15), Embaye *et al* (13) and Khanam *et al* (1), as they also reported the maximum incidence of cases in younger (<30 years) age group. However, the study by Singh and Tyagi (17) reported that patients aged 31 to 40 years had the most cases of breast lumps.

Moreover, the present study revealed that fibroadenoma was the most common diagnosis followed by inflammatory lesion/mastitis/abscess among the benign lesions of the breast. These findings are in agreement with those of other studies performed by Singh and Tyagi, Rioki *et al* (16), Madan *et al* (15), Qadri *et al* (14), Embaye *et al* (13) and Khanam *et al* (1). These authors also reported that the most common diagnosis was fibroadenoma in benign lesions (1,13-17). In contrast to previous studies, FNA clinic of Hindu Rao Hospital deals with a variety of benign lesions with significant proportions of benign cases other than fibroadenomas.

Table III. Analysis of the duration of clinicopathological features.

A, Sex

Duration	Total (n=301)	Male (n=5)	Female (n=296)	P-value
Median (range)	4 (0.1-144) months	2 (1-6) months	4 (0.1-144) months	P=0.351, Mann-Whitney test

B, Nature of lesion

Duration	Total (n=301)	Benign cases (n=280)	Malignant cases (n=21)	P-value
Median (range)	4 (0.1-144) months	4 (0.1-144) months	4 (0.1-48) months	P=0.767, Mann-Whitney test

C, Laterality

Duration	Total (n=301)	Left (n=127)	Right (n=166)	Bilateral (n=8)	P-value[a]
Median (range)	4 (0.1-144) months	6 (0.1-144) months	3 (0.1-120) months	12 (1-120) months	**P=0.018**, Kruskal-Wallis test

D, IAC category

Duration	Total (n=301)	C1 (n=59)	C2 (n=197)	C3 (n=24)	C4 (n=9)	C5 (n=12)	P-value[b]
Median (range)	4 (0.1-144) months	4 (0.1-120) months	4 (0.1-144) months	12 (0.2-84) months	2 (0.1-12) months	7.5 (0.5-48) months	**P=0.039**, Kruskal-Wallis test

[a]Pair-wise analysis was also performed using Dunn's test with the following results: Right vs. left, **P=0.024**; right vs. bilateral; **P=0.044**; left vs. bilateral, P=0.204. [b]Pair-wise analysis was also performed using Dunn's test with the following results: C1 vs. C2; P=0.274, C1 vs. C3; **P=0.006**, C1 vs. C4; P=0.414, C1 vs. C5; P=0.206, C2 vs. C3; P=**0.021**, C2 vs. C4; P=0.182, C2 vs. C5; P=0.423, C3 vs. C4; **P=0.015**, C3 vs. C5; P=0.463, C4 vs. C5; P=0.116. Values in bold font in the table and legend indicate statistically significant differences (P<0.05).

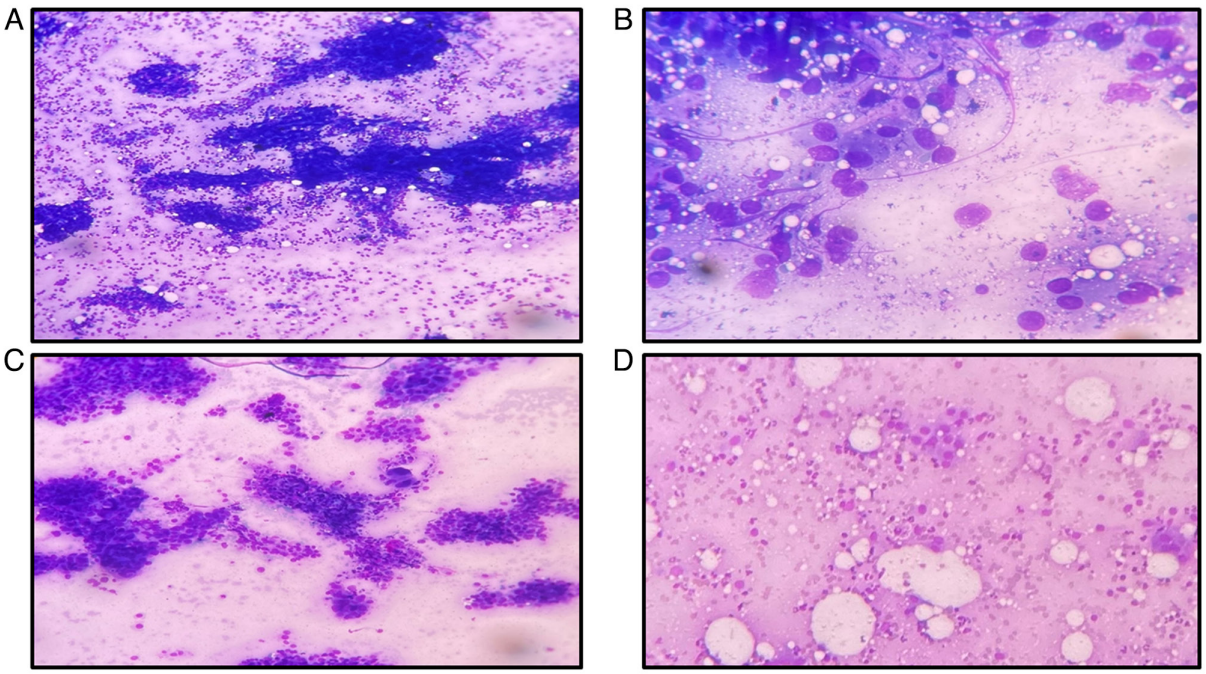


Figure 2. Photomicrograph illustrating branching cluster from a case of (A) fibroadenoma (MGG staining; magnification, x10), (B and C) loosely cohesive cluster of atypical cells from two different areas of a case of ductal carcinoma [MGG staining; (B) magnification, x40; (C) magnification, x10] and (D) lymphocytes, histiocytes and neutrophils from a case of mastitis.

Table IV. Distribution of breast lesions according to clinical features and comparison with IAC category.

A, Site of tumor

Site	Total (%)	C1	C2	C3	C4	C5
Upper-outer	113 (37.54)	24	66	12	3	8
Lower-outer	42 (13.95)	7	31	3	1	0
Sub-areolar	55 (18.27)	15	33	5	2	0
Upper-inner	73 (24.25)	7	57	2	3	4
Lower-inner	14 (4.65)	3	10	1	0	0
Axillary tail of breast	4 (1.34)	3	0	1	0	0
Total	301 (100)		Overall Fisher's exact test[a], **P=0.022**			

B, Site of tumor (upper half)

Site	Total (%)	C1	C2	C3	C4	C5
Upper half	186 (61.8)	31	123	14	6	12
Non-upper half	115 (38.2)	28	74	10	3	0
Total	301 (100)		Overall Fisher's exact test[b], **P=0.028**			

C, Laterality of tumor

Laterality	Total (%)	C1	C2	C3	C4	C5
Left	127 (42.19)	26	86	8	2	6
Right	166 (55.15)	30	107	15	7	6
Bilateral	8 (2.66)	1	6	1	0	0
Total	301 (100)		Overall Fisher's exact test[c], P=0.852			

D, Mobility of tumor

Mobility	Total (%)	C1	C2	C3	C4	C5
Mobile	294 (97.7)	58	197	23	8	8
Non-mobile	7 (2.3)	1	0	1	1	4
Total	301 (100)		Overall Fisher's exact test[d], **P=0.001**			

E, Consistency of tumor

Consistency	Total (%)	C1	C2	C3	C4	C5
Firm, non-tender	288 (95.7)	56	193	22	8	9
Firm, tender	7 (2.31)	1	4	2	0	0
Hard, non-tender	6 (1.99)	2	0	0	1	3
	301 (100)		Overall Fisher's exact test[e], **P=0.001**			

[a]Pair-wise analysis was also performed using Bonferroni's correction and the results were as follows: C1 vs. C2, **P=0.030**; C1 vs. C3, P=0.999; C1 vs. C4, P=0.999; C1 vs. C5, P=0.690; C2 vs. C3, P=0.490; C2 vs. C4, P=NS; C2 vs. C5, P=0.999; C3 vs. C4, P=0.999; C3 vs. C5, P=0.999; C4 vs. C5, P=0.999. [b]Pair-wise analysis was also performed using Bonferroni's correction and the results were as follows: C1 vs. C2, P=0.999; C1 vs. C3, P=0.999; C1 vs. C4, P=0.999; C1 vs. C5, **P=0.020**; C2 vs. C3, P=0.999; C2 vs. C4, P=0.999; C2 vs. C5, P=0.090; C3 vs. C4, P=0.999; C3 vs. C5, P=0.150; C4 vs. C5, P=0.630. [c]Pair-wise analysis was also performed using Bonferroni's correction and the results were as follows: C1 vs. C2, P=0.999; C1 vs. C3, P=0.999; C1 vs. C4, P=0.999; C1 vs. C5, P=0.999; C2 vs. C3, P=0.999; C2 vs. C4, P=0.999; C2 vs. C5, P=0.999; C3 vs. C4, P=0.999; C3 vs. C5, P=0.999; C4 vs. C5, P=0.999. [d]Pair-wise analysis was also performed using Bonferroni's correction and the results were as follows: C1 vs. C2, P=0.999; C1 vs. C3, P=0.999; C1 vs. C4, P=0.999; C1 vs. C5, **P=0.020**; C2 vs. C3, P=0.999; C2 vs. C4, P=0.440; C2 vs. C5, **P=0.010**; C3 vs. C4, P=0.999; C3 vs. C5, P=0.340; C4 vs. C5, P=0.999. [e]Pair-wise analysis was also performed using Bonferroni's correction and the results were as follows: C1 vs. C2, P=0.630; C1 vs. C3, P=0.999; C1 vs. C4, P=0.999; C1 vs. C5, P=0.570; C2 vs. C3, P=0.999; C2 vs. C4, P=0.530; C2 vs. C5, **P=0.010**; C3 vs. C4, P=0.999; C3 vs. C5, P=0.270; C4 vs. C5, P=0.999. Values in bold font in the table and legend indicate statistically significant differences (P<0.05). IAC, International Academy of Cytology.

However, the present study also reported that 19.6% of FNA procedures in the IAC category C1 (insufficient/unsatisfactory). This may be due to involvement of fresh DNB/post graduate student in FNA procedure. Although the adequacy of FNAC is dependent on multiple factors, the experience of the operator is second most common cause for its inadequacy. In previous studies, the percentage of inadequacy of aspiration was shown to range from 0.7 to 25.3%. As stated in the study by Mendoza *et al* (18), the success rate of FNAC is also dependent on the experience of the operator.

The significance of various clinical features of breast lumps should be considered. The present study assessed the association of different clinical features of breast lumps with the diagnosis of the lesions. The present study reported that the duration of presentation of breast lumps in males was lower than that in the female; this may be due to the reason that breasts in male are not developed; moreover; even minimal changes can be immediately noticeable by the patient.

In terms of the site of breast lumps, in the present study, it was found that the majority of the lumps were in the upper quadrant of the breast. This finding is in accordance with the findings of the study by Khanam *et al* (1).

The present study also analyzed the laterality (side) of breast lumps and found that breast lumps were most common in the right-sided breast as compared with the left-sided and bilateral breasts. This result was similar to that of the study by Qadri *et al* (14). However, in the study done Khanam *et al* (1), left-sided breast lumps were reported to be the most common.

In the present study, the median size of breast lumps was significantly lower in patients with lumps as compared with those with malignant lumps (median size, 2 vs. 4 cm^2, respectively). A previous study also revealed that the malignant lesion was larger in size than the benign (19).

Moreover, following the analysis of the duration of presentation of breast lumps for each side, it was found that duration of presentations of lumps was highest in the bilateral breast as compared with the left and right-sided breast. The duration of presentation of lumps was also higher in the left-compared with the right-sided breast.

In terms of mobility and consistency of the breast lumps, the present study found significant differences in mobility, as well as consistency between the malignant and benign lumps. The malignant lumps were non-mobile, whereas the benign lumps were mobile. In addition, in terms of the consistency of lumps, malignant lumps were hard and non-tender, while the benign ones were not.

To the best of our knowledge, none of the studies published to date in the English language have assessed the association between the duration of presentation of breast lumps, mobility and consistency and the IAC category of breast lesions. In view of this, the significant findings of the present study, in the context of the duration of presentation, mobility and consistency of breast lumps are key factors.

There were no significant differences found in the laterality and IAC category of the lesions, except for the localization (site) of the lumps. It was found that the upper quadrant of the breast was the most prevalent site for malignant lesions, whereas for benign lesions, the non-upper quadrant was the most prevalent site. In previous studies performed by Chan *et al* (20) and Hussain (21), it was also reported that the upper quadrant was dominant site for overall palpable breast lumps.

In conclusion, there were statistically significant differences between some of the clinical features, namely the duration of presentation, site, mobility, consistency of breast lump and cytology category. Considering that the clinical examination features of breast lump is crucial for the effective diagnosis of breast disease, the findings of the present study not only re-emphasize (12) the importance of thorough clinical examination of patient with breast lumps, but can also be considered as relevant for the better management of breast lumps.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

All authors (SKS, SS and SK) contributed to the conception and design of the study. Material preparation was performed by SKS and SS. Data collection and analysis were performed by SKS and SS. Analysis was performed by SKS and SS. SS and SK confirm the authenticity of all the raw data. The first draft of the manuscript was written by SKS and all authors commented on previous versions of the manuscript. All authors have read and approved the final version of the manuscript.

Ethics approval and consent to participate

The present study was performed after obtaining approval from the Institutional Ethics Committee, NDMC Medical College and Hindu Rao Hospital, Delhi vide letter no. IEC/NDMC/2022/109 dated 17.06.2022 and written informed consent from the patients for participation was also obtained. The present study was conducted in accordance with the Declaration of Helsinki.

Patient consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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