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Cytomorphological spectrum of various breast lumps using FNAC as diagnostic modality

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Abstract

Background: Breast carcinoma is the most common malignant tumour and the leading cause of death from cancer in women. FNAC of breast lumps is an important mode of investigation and forms a part of triple test. FNAC is cost effective and can prevent unnecessary surgery. This study intended to look the frequencies of different lesions in FNAC of palpable breast lump.

Methods: It is a hospital based prospective study conducted from November 2016 to October 2017 conducted in Department of Pathology, GMC Jammu. FNAC was done in a total of 289 patients who presented with palpable breast lump along with suspected enlarged axillary lymph node, if any. We assessed the age of the patient, lesion size, site, type of lesion and axillary lymph node metastasis in case of malignancies.

Results: Out of 289 patients studied, 250 (86.5%) were females and 39 (13.4%) were males. Age ranges from 7-88 years with a mean age of 36 years. Most of the patients were in 21-30 years age group (30.6%). 241 cases (96.4%) presented with breast lump while the swelling was diffuse in 9 cases. Maximum number of cases in females were seen in the age group of 21-30 years i.e. 75 cases (30%). Upper outer quadrant was the most common quadrant involved in females with 70 cases (28%). On FNAC, there were 36 cases (12.4%) of Inflammatory lesions, 198 (68.5%) of benign cases and 29 cases (10.06%) of carcinoma breast. Among the benign lesions maximum number of cases i.e. 58 cases (20.06%) were reported as Fibroadenoma. On cytological categorisation of breast diseases on FNAC, maximum number of cases i.e. 221 (76.4%) were categorised as C2 (Benign) followed by 29 cases (10.06%) categorised as C5 (Malignant).

Keywords: FNAC, breast, fibroadenoma

Introduction

Breast diseases are common affliction of the females. Various breast diseases are inflammatory diseases, benign epithelial lesions and carcinoma/carcinoma in situ. Carcinoma of the breast is the most common non - skin malignancy in women worldwide. Breast cancer is the most common cancer in women in India and accounts for 27% of all cancers in women (Ferlay *et al.*, 2012) [8]. According to a 2016 report published by the Indian Council of Medical Research, breast cancer is now the most common cancer among urban Indian women, with approximately 1,44,000 new cases being reported every year. Carcinoma breast is the second leading cause of cancer mortality after lung cancer. Globally over the last several decades, the incidence of breast cancer has increased and the greatest increase has been seen in Asian countries where breast cancer incidence peaks among women in their forties whereas in the United States and Europe, it peaks among women in their sixties (Anderson *et al.*, 2008) [4]. India with its multilingual, and multiethnic society has reported breast cancer as the commonest cancer in urban Indian females, and the second commonest in the rural Indian women (ICMR, 2016). As per the ICMR HBCR data, breast cancer is the commonest cancer among women in urban registries of Delhi, Chandigarh, Mumbai, Chennai, Guwahati, and Trivandrum where it constitutes 20-30% of all cancers in female (National Cancer Registry Program, ICMR 2016). Almost all Indian women often do not present for medical care early enough due to various reasons such as illiteracy, lack of awareness, financial constraints, lack of an organized screening program and paucity of diagnostic aids. It is hardly surprising that the majority of breast cancer patients in India are still treated at locally advanced and metastatic stages (Aggarwal *et al.*, 2007) [2]. Detection of it in earlier stages is made possible by a triple assessment which includes clinical examination, radiological imaging and FNAC.

The investigation of palpable breast lumps utilises a multidisciplinary approach that centers around the ‘Triple test’, i.e. analysing clinical and radiological findings in conjunction with the pathologic features to diagnose the lesion and determine the best treatment plan for the patient (Kocjan *et al.*, 2008) [14]. Therefore, a method for definitive diagnosis of patients who present with breast lump at the outpatient clinic is needed. This method must be accurate and easy to perform. It must also be acceptable to the patients and must not require too much preparation or expensive equipment. The main purpose of FNAC breast lumps is to confirm cancer preoperatively and to avoid unnecessary surgery in various benign conditions. FNAC has been used as a diagnostic modality and is currently used as one of the modalities of triple assessment for breast lesions (Agarwal *et al.*, 2003) [1]. FNAC is highly cost effective and accurate. It is safe, simple, rapid and relatively painless and has become an acceptable and widely practiced minimally invasive technique. Fine-needle aspiration cytology is useful owing to finer needle size and is easier/safer in certain lesions, such as very small lesions, lesions just under the skin or very close to the chest wall. In addition, FNAC maintains tactile sensitivity, allows multidirectional passes allowing a broader sampling of the lesion and immediate reporting where necessary.

The objective of this study was to evaluate breast lumps via fine needle aspiration cytology using papanicolaou and giemsa stains.

Material and Methods

The present study was a hospital based study on the routine materials from the department of Pathology, Government Medical College, Jammu. Subjects were retrospectively studied over a period of one year from November 2016 to October 2017. In each case, personal information and clinical history like age, size of swelling, duration of swelling, location of swelling, history of any discharge from the nipple, pain, adherence to adjacent structures, and physical examination along with evaluation of mammographic findings, if any was carried out. All the FNAC’s done

received in the Pathology Department, Government Medical College, Jammu were included in the study. After explaining the procedure to the patient, informed consent was taken. The skin above the area to be aspirated was swabbed with an antiseptic solution and after locating the mass, needle was inserted into the mass and maneuvered under negative pressure by moving the needle back and forth into the mass. Needle was then withdrawn after releasing the negative pressure and slides were immediately prepared and fixed in isopropyl alcohol for Papanicolaou stain and air dried for Giemsa stain.

Results

Total number of cases studied were 289 in our study. Out of 289 cases studied, 250 (86.5%) were females and 39 (13.4%) were males. Female: Male ratio was 6.4: 1. The age of the patients ranged from 7 years to 88 years with mean age of 36 years.

Maximum number of cases in females were seen in the age group of 21-30 years i.e. 75 cases (30%) as depicted in the Table 1.

Table 1: Age wise distribution of breast lesions in females

Age Group (years)	No. of cases	Percentage
0-10	3	1.2
11-20	33	13.2
21-30	75	30.0
31-40	68	27.2
41-50	42	16.8
51-60	16	6.40
61-70	12	4.8
71-80	0	0
81-90	1	0.4
Total	250	100

Side of breast

In females left breast was most commonly involved with 136 cases (54.4%) presenting with left breast swelling. 111 cases (44.4%) presented with right breast lesion and 3 cases (1.2%) had bilateral breast swelling as depicted in Figure 1.

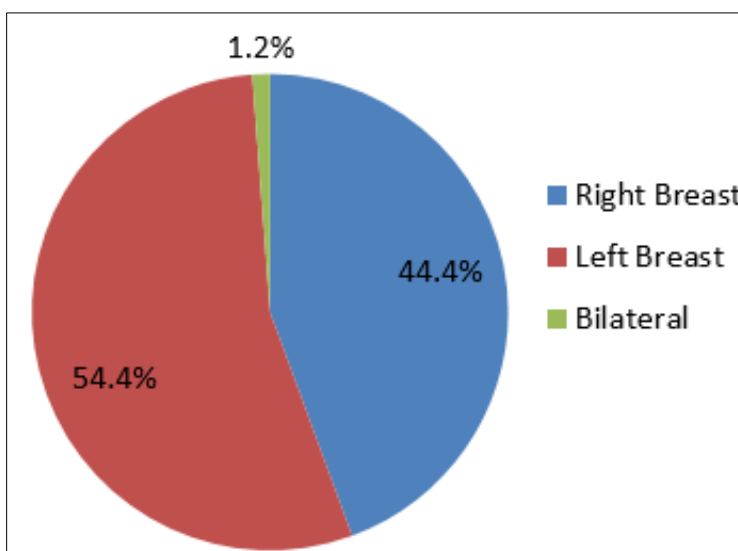


Fig 1: No. of cases

Position of breast involvement in females

Upper outer quadrant was the most common quadrant involved in females with 70 cases (28%) followed by upper

inner quadrant involvement with 62 cases (24.8%) as depicted in Table 2.

Table 2: Position of breast involvement in females

Position	No. of cases	Percentage
UOQ	70	28.0
LOQ	43	17.2
UIQ	62	24.8
LIQ	35	14.0
Supra areolar	3	1.2
Subareolar	12	4.8
Periareolar	12	4.8
Diffuse	9	3.6
Axillary tail	4	1.6
Total	250	100

Clinical Presentation in females

Out of 250 female patients, 241 cases (96.4%) presented with breast lump while the swelling was diffuse in 9 cases (3.6%) as depicted in Figure 2. Nipple discharge was seen in 7 cases (2.8%) and mastalgia in 7 cases (2.8%). Axillary lymph node was involved in 10 cases (4%), 7 cases (2.8%) presented with retracted nipple, 5 patients (2%) had peau d orange appearance of the overlying skin while 2 patients (0.8%) presented with ulceration lesion. There was history of trauma in 3 cases (1.2%). 10 patients (4%) were lactating in our study.

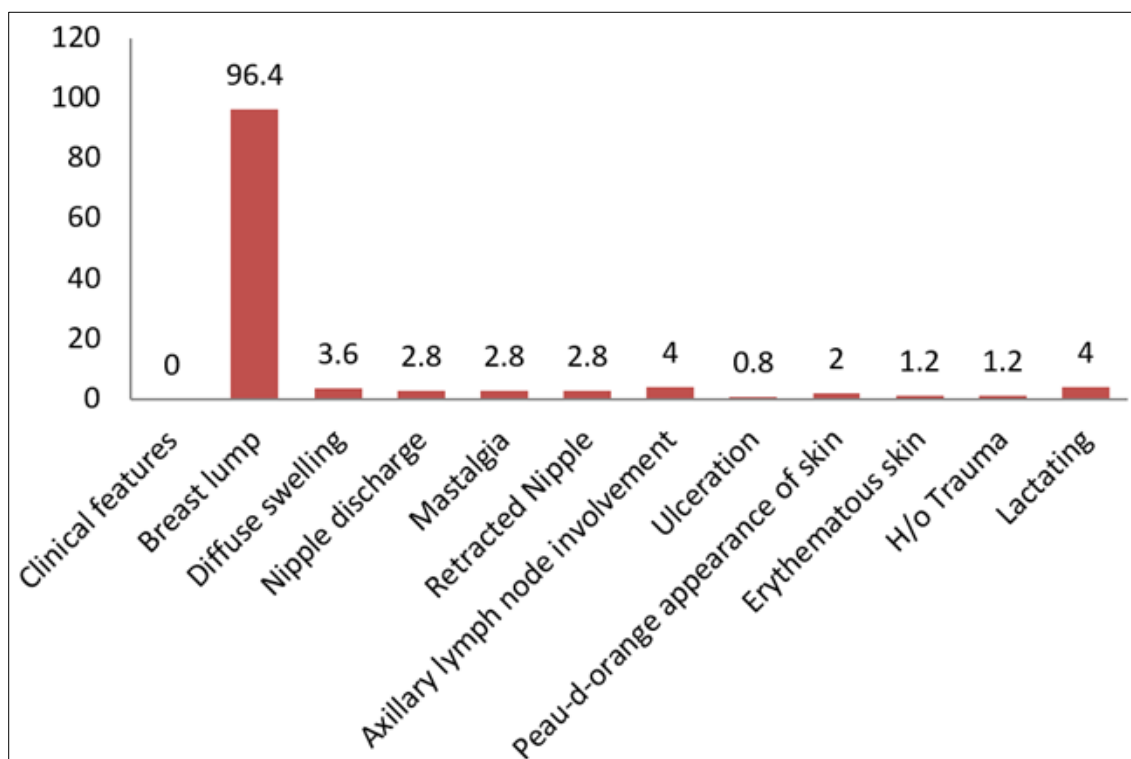


Fig 2: Clinical presentation of breast diseases in females

Age wise distribution in Males

In males, maximum number of cases were in the age group of 21-30 years i.e. 10 cases (25.6%) followed by 6 cases (15.3%) in the age group of 61-70 years.

Side of breast involvement in Males

In males, left breast was involved in 19 cases (48.7%), right breast in 15 cases (38.4%) and breast involvement was bilateral in 5 cases (12.82%).

Clinical presentation of breast diseases in males

Maximum number of cases in males i.e. 22 cases (56.4%) presented with diffuse swelling as depicted in Table 3. Breast lump was noticed in 17 cases (43.58%), mastalgia in 2 cases (5.1%) and there was history of trauma in 1 case (2.5%).

Table 3: Clinical presentation of breast diseases in males

Position	No. of cases	Percentage
Diffuse	22	57.1
UOQ	2	4.7
LOQ	1	2.3
UIQ	2	4.7
LIQ	1	2.3
Supra areolar	1	2.3
Subareolar	6	16.6
Periareolar	4	9.5
Total	39	100

On FNAC, there were 36 cases (12.4%) of Inflammatory lesions, 198 (68.5%) of benign cases and 29 cases (10.06%) of carcinoma breast as depicted on figure 3.

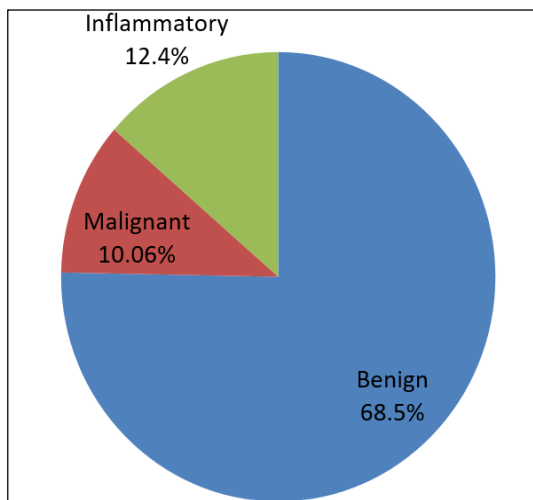


Fig 3: Distribution of various lesions in breast

Benign lesions

Among the benign lesions maximum number of cases i.e. 58

cases (20.06%) were reported as Fibroadenoma followed by Gynaecomastia with 30 cases (10.4%), Fibroadenomatosis with 24 cases (8.3%) and Fibrocystic disease with 19 cases (6.5%) as depicted in Figure 4. 2 cases (0.6%) of Ductal papilloma and 1 case (0.3%) of phyllodes tumour were also reported.

Inflammatory lesions

Among the inflammatory lesions most commonly seen was Acute mastitis and Breast abscess with 13 cases (4.5%) each respectively. Granulomatous mastitis was seen in 5 cases (1.7%), chronic mastitis in 4 cases (1.3%) and Fat necrosis in 1 case (0.3%).

Malignant lesions

29 cases (10.06%) were categorised as malignant on FNAC. There were 5 cases (1.7%) of Galactocoele and lactational changes were seen in 2 cases (0.6%). 55 cases (19.03%) were categorised as benign nonspecific while sample was unsatisfactory for any valid diagnosis in 24 cases (8.3%).

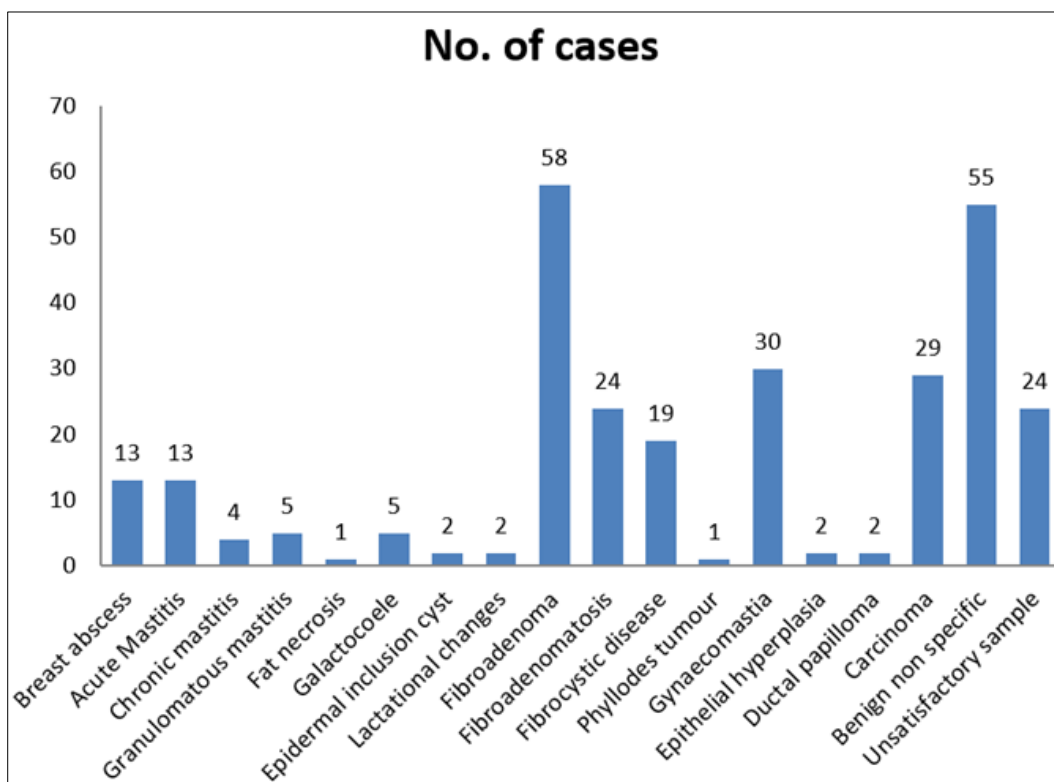


Fig 4: Distribution of various breast diseases on FNAC

Cytological categorisation of breast lesions on FNAC

On cytological categorisation of breast diseases on FNAC, maximum number of cases i.e. 221 (76.4%) were categorised as C2 (Benign) followed by 29 cases (10.06%) categorised as C5 (Malignant). 14 cases (4.8%) were categorised as C3 (Atypical/indeterminate), 1 case (0.3%) as C4 (Suspicious) and 24 cases (8.3%) as C1 (Unsatisfactory sample) as depicted in Figure 5.

In the C2 (Benign) category, out of 221 cases 55 cases had benign non specific diagnosis reported while benign specific diagnosis was given in 166 cases.

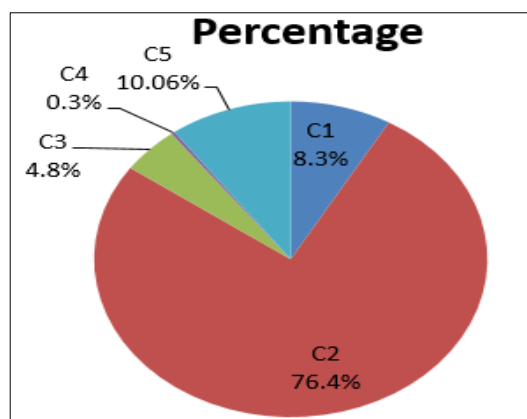


Fig 5: Cytological categorisation of breast diseases on FNAC

Age wise distribution of benign and malignant breast diseases

Maximum number of benign breast diseases were seen in the age group of 21-30 years i.e. 83 cases (35.02%) followed by 55 cases (23.2%) in the age group of 31-40 years.

Maximum number of malignant breast disease were seen in the age group of 41-50 years i.e. 12 cases (37.5%) followed by 9 cases (28.1%) in the age group of 31-40 years.

Distribution of benign and malignant breast diseases according to duration of breast disease in months

Maximum number of cases with benign breast disease i.e. 106 cases (44.7%) had duration of breast lump ranging from 1 to 6 months followed by 72 cases (30.3%) with duration less than 1 month.

Most of the patients with malignant breast lesion i.e. 20 cases (62.5%) had duration of the breast lump ranging from 1 to 6 month followed by 6 cases (18.7%) with duration of 6 to 12 months.

Distribution of benign and malignant breast diseases according to size of lump

Maximum number of cases with benign breast lesion i.e. 177 cases (74.6%) had breast lump ranging in size from 2-5 cm followed by 57 cases (24.05%) with size less than 2 cm and 3 cases (1.2%) with size more than 5 cm.

25 cases (78.1%) with malignant breast lesion had size of the breast lump ranging in size from 2-5 cm followed by 4 cases (12.5%) with size more than 5 cm and 3 cases (9.3%) with size less than 2 cm.

Correlation with radiological features

Out of all cases characterised as benign breast lesion, mammographic findings were available for 28 cases. Out of 28 cases i.e. 12 cases (42.8%) characterised as benign breast lesion had BIRADS category III on mammography followed by 9 cases (32.1%) with BIRADS category II and 4 cases (14.2%) with BIRADS category I as depicted in Figure 6. 2 cases (7.1%) characterised as benign breast lesion had BIRADS category IV.

Mammographic details were available for 2 cases characterised as malignant breast lesion with BIRADS category III and IV as depicted in Figure 6.

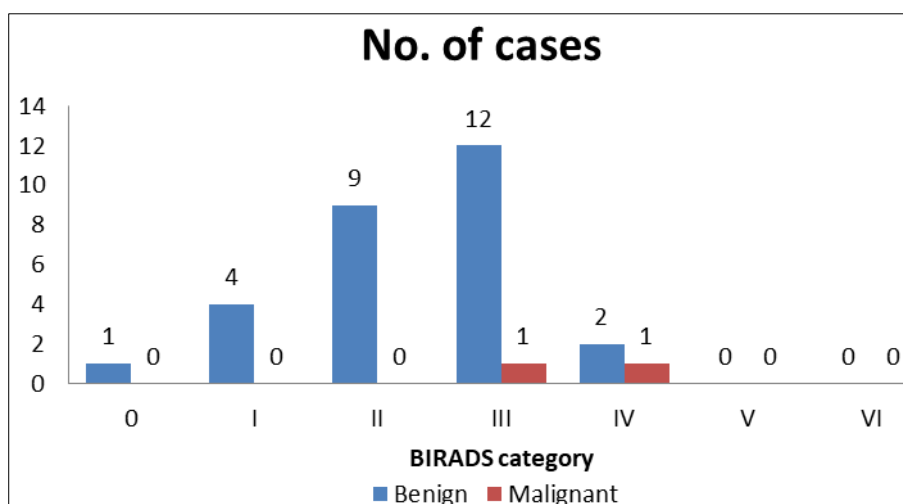


Fig 6: Distribution of benign and malignant breast diseases according to BIRADS category

Discussion

Breast pathology is one of the most common pathologies encountered in routine practice. Early diagnosis is the key to increase survival. Breast cancer is the most common cancer in women all over India. Due to lack of awareness and almost nonexistent breast screening practices, most of the patients present in advanced stages of disease.

The high incidence of breast malignancy, its relatively easy detection at an early stage, and effective treatment in the form of conservative surgery and chemotherapy had prompted a worldwide initiation of triple assessment including a clinical (palpation), radiologic (ultrasonography or mammography), and cytological (FNAC) assessment.

The current study is a 1 year study w.e.f 01 Nov 2016 to 31st Oct 2017 and represents a data on 289 cases who presented with signs and symptoms of breast lesions and were evaluated using FNAC.

Out of total 289 cases in our study, major disease group was of benign lesions (68.5%), followed by inflammatory diseases (12.4%) and malignant lesions were 10.06%.

There were 250 females and 39 males in our study with Female: Male ratio of 6.4:1. The age of the patients in our study ranged from 7-88 years with mean age of 36 years.

Maximum incidence of breast lesions was seen in the age group of 21-30 years. Maximum number of benign breast disease were seen in the age group of 21-30 years and maximum number of malignant breast diseases were seen in the age group of 41-50 years.

Our findings were comparable with the studies done by Ahmed *et al.* (2009) [3], Hebbar *et al.* (2013) [10] and Garg *et al.* (2007) [9].

Garg *et al.* (2007) [9] reported that the maximum number of patients with benign diagnosis was in the fourth decade (42.11%) and malignant diagnosis in the fourth as well as fifth decade (35.48% each). In the study by Homesh *et al.* (2005) [11], the patient age ranged from 15-74 years with the mean age of 33.7 years which was comparable to our study. As per statistics from Breast Cancer India (BCI), the average age of developing a breast cancer has undergone a significant shift over last few decades. An increasing numbers of patients are in the 25 to 40 years of age. In our study 65.6% cases were seen in the age group of 31-50 years.

In our study, left breast was more commonly involved in females which is comparable with the study done by Supriya *et al.* (2015) [25]. The most common presenting symptom in females in our study was lump breast (96.4%) while 3.6% had

diffuse swelling. Our findings were comparable with Homesh *et al.* (2005)^[11], with 88.5% females presenting with breast lump in their study. Most common location of lump in females in our study was upper half of breasts (51.8%) while 32.4% cases presented with lump in lower half of breasts. Our findings are comparable with the study of Saha *et al.* (2016)^[23], El-Ghorori *et al.* (2004)^[7] and Kim *et al.* (2000)^[13]. Upper outer quadrant was the most commonly involved quadrant in females. 50% females had lump in the upper outer quadrant in the study done by Saha *et al.* (2016)^[23] and El-Ghorori *et al.* (2004)^[7] in their study reported that 58% presented with lumps in upper quadrants. Hussain (2005)^[12], in his series had 58% of female patients in whom upper outer quadrant was involved in breast lumps.

Most common presentation in males was a diffuse swelling breast (56.4%) while 43.5% males presented with breast lump. Left breast was more commonly involved.

Out of total 289 cases in our study, major disease group was of benign lesions (68.5%), followed by inflammatory diseases (12.4%) and malignant lesions were 10.06%. The size of lumps varied from 0.2 cm to 10 cm in our study. Out of 60 breast lumps with size less than 2cm, 95% were benign and 5% were malignant. Out of 202 breast lumps with size ranging from 2-5 cm, 87.6% were benign and 12.3% were malignant. Out of 7 breast lumps with size more than 5 cm, 57.1% were malignant and 42.8% were benign. In our study, 98.6% of benign lesions were up to 5cm in size while 90.6% of malignant lesions were more than 2 cm in size. These findings suggest that lumps of larger size had more chances of being malignant than of smaller size lumps. The goal of the breast cancer screening is to reduce deaths due to breast cancer by detecting breast cancer early, and reduce the incidence of advanced disease. Approximately 10% of invasive cancers 1 cm in size or smaller have spread to lymph nodes at the time of detection, compared to close to 35% of those 2 cm in size and 60% of those 4 cm or larger in size (Ries *et al.*, 2007)^[21].

Mitra *et al.* (2016)^[17] in their study reported that 71.4% of breast lumps of >3cm of size were malignant and 57.5% of breast lumps with size <3 cm were benign and 42.5% were malignant. In the study by Shastri (2016)^[24], the size of breast lumps ranged from 2-12 cms. 92% of benign lesions were up to 5 cm size. Malignant lesions ranged between 5 to 11.8 cm and among them 71.42% measured 5-10 cm in diameter. In our study, out of 32 malignant cases, 9 presented with palpable axillary lymph nodes, 3 with retracted nipple, 2 with ulcerated lesion and 4 cases with peau d'orange appearance of the overlying skin.

On evaluation of breast lumps using FNAC, in our study major group of disease in our study were benign breast lesions (68.5%). Among the benign diagnosis, 20.06% cases were Fibroadenoma, 8.3% were Fibroadenomatosis, 7.3% were Fibrocystic change, and 10.4% were Gynaecomastia. In the present study fibroadenoma was the most common benign lesion which correlates with the findings of Kuijper *et al.* (2001)^[15].

Rahman *et al.* (2013)^[20] reported 28.57% cases and, Kumar (2010)^[16] reported 22% cases and of Fibroadenoma on FNAC in their study. The results of these studies are comparable with our study (20.06%).

The incidence of fibrocystic change varies in different studies. Rahman *et al.* (2013)^[20] reported 11.81% cases, Kumar (2010)^[16] reported 41.2% cases and Bukhari *et al.* (2011)^[5] reported 21.17% cases of Fibrocystic change on FNAC. The number of Fibrocystic change cases in our study

is lower than the above mentioned studies. The possible reason may be that, since it is not a population based study, we may not get the exact scenario. Besides, Fibrocystic change presents with ill defined mass with no pain or less complaints, female may feel reluctant to seek consultation for this type of lesion.

It is important to distinguish benign breast lesions from breast carcinoma because the majority of benign lesions are not associated with an increased risk for subsequent breast cancer, hence unnecessary surgical procedures can be avoided. In our study, 10.06% cases were reported as carcinoma on FNAC, which is comparable with studies done by Rahman *et al.* (2013)^[20], Rupom *et al.* (2011)^[22], Pradhan *et al.* (2008)^[19] in which their were 14.17%, 13.74% and 15.5% cases of carcinoma reported respectively on FNAC.

In the study by Chaurasiya *et al.* (2017)^[6], 30.9% patients had fibroadenosis, 21.8% had fibroadenoma, 10.9% patients had chronic mastitis, 9% had acute mastitis, 7.3% had fibrocystic disease, 5.5% patients had carcinoma of breast and 3 patients had gynaecomastia on FNAC.

Rahman *et al.* (2013)^[20] in his study found that among the lesions 28.57% were fibroadenoma, 14.17% carcinoma, 11.81% fibrocystic change, 7.93% abscess, 6.52% granulomatous lesion, 6.3% chronic mastitis were identified on FNAC.

In our study, there were 12.4% cases of benign inflammatory lesion and majority of these were acute mastitis and breast abscess.

Chaurasiya *et al.* (2017)^[6] found in their study 20% cases of benign inflammatory lesions, and the majority of these were of acute and chronic mastitis. The other lesions diagnosed by FNAC were fat necrosis, benign cystic lesions, galactocoele, lactational changes and granulomatous mastitis.

Out of the 39 males included in our study, 30 cases were reported as Gynaecomastia while remaining cases either had benign non specific diagnosis or unsatisfactory sample on FNAC.

The mean rate of unsatisfactory fine needle aspirates in our study was 8.3%. The intrinsic properties of the mass (poor cellularity, fibrosis & hemorrhage) may be contributing factors in unsatisfactory cases. Also large ill defined mass results in a higher proportion of unsatisfactory aspirates. Hypocellular lesions (which contained few cellular components) and some lesions like radial scar or a complex sclerosing adenosis often show unsatisfactory cytology results. Inadequacy rate on FNAC can be reduced with the use of ultrasound guided FNAC and an immediate evaluation by a pathologist using rapid staining either Romanowsky or Diff-Quick stain.

Conclusion

Fine-needle aspiration cytology is useful owing to finer needle size and is easier/safer in certain lesions, such as very small lesions, lesions just under the skin or very close to the chest wall. In addition, FNAC maintains tactile sensitivity, allows multidirectional passes allowing a broader sampling of the lesion and immediate reporting where necessary. Fine-needle aspiration (FNA) can be used for the diagnosis of inflammatory swellings of breasts such as abscess, granulomatous diseases including tuberculosis. The aspirates can be used to culture organisms and special stains like Ziehl-Neelsen, Gram's stain can be used to identify bacilli.

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