

A Study of Patterns of Breast Lesions Diagnosed on Fine-Needle Aspiration Cytology in a Tertiary Care Hospital of Mandya

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ABSTRACT

BACKGROUND

Breast lump is fairly a common complaint in females for which patient seeks medical advice and becomes anxious about the diagnosis. Quick diagnosis by fine-needle aspiration cytology (FNAC) relieves patient's anxiety and assists in their preoperative management and overall treatment. This study was conducted to find out the cytomorphological patterns and distribution of breast lesions in various age groups in our institute.

METHODS

This is a prospective observational study of breast lesions conducted in the Mandya Institute of Medical Sciences, Mandya, for a period of 18 months from January 2016 to June 2017. About 200 cases were studied by cytology and correlated with histopathology wherever biopsy specimens were available, and were stained with haematoxylin and eosin (H & E) and May–Grunwald–Giemsa stains (MGG). Cases were grouped according to the five-tier reporting format for breast lesion (C1 – C5) laid down by National Cancer Institute.

RESULTS

The spectrum of breast lesions on cytomorphological interpretation was 1 % inadequate / insufficient material (C1), 80 % benign (C2), 1.5 % atypia probably benign (C3), 0.5 % suspicious of malignancy (C4) and 17 % malignant (C5). Out of 200 cases studied, 160 cases were benign lesions, and 34 cases were malignant lesions. Most of the benign lesions belonged to the age group 21 - 30 years followed by 31 - 40 years. Malignant lesions were maximum in the age group of 41 - 50 years. In benign disease, fibroadenoma was the commonest i.e. (31 %) followed by fibrocystic change (22 %), benign epithelial hyperplasia (8.7 %), acute mastitis (3 %), chronic mastitis (2 %), epidermal cyst (1.8 %), subareolar abscess, granulomatous mastitis, galactocele (1 %) and gynaecomastia (8.5 %). In the malignant group, infiltrating ductal carcinoma - not otherwise specified, was the commonest lesion (82.4 %), followed by mucinous carcinoma (8.8 %), papillary carcinoma, medullary carcinoma and metaplastic carcinoma (2.9 %). In this study, the specificity, sensitivity, positive and negative predictive value, and diagnostic accuracy of fine-needle aspiration cytology were 100 %, 90 %, 100 %, 95 %, and 96 %, respectively.

CONCLUSIONS

FNAC of the breast lump is an easily performed outpatient diagnostic method for determining the nature of the breast mass.

KEYWORDS

FNAC, Fibroadenoma, Haematoxylin and Eosin, Infiltrating Ductal Carcinoma - Not Otherwise Specified (IDC NOS), May Grunwald Giemsa

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BACKGROUND

Lesions of the breast are among the most common health problems in females. They primarily present with pain, palpable mass and nipple discharge.¹ The incidence of breast cancer in recent decades has increased worldwide, mainly due to improvements in screening and diagnosis which is diagnosing this. The other cause being changes in the lifestyle and habits of women.² Breast cancer is the most common non skin malignancy in women and it stands second to the lung cancer as a cause of cancer death.³ Incidence of breast cancer increases with age. Patients with breast cancer will have very good prognosis if detected at an early stage.⁴

According to GLOBOCAN 2012 project, breast cancer is the second most common cancer in the world with an incidence of 1.67 million cases. Breast cancer is the most common cancer in women in India, way ahead of cervical cancer. In India 1,44,937 women were newly detected with breast cancer and 70,218 died of breast cancer.⁵ Breast cancer incidence peaks between the ages of 40 and 50 years, with a mean age of occurrence at 47 years. Breast cancer patients in India mostly present with palpable lump and with the lymph node metastasis at the time of diagnosis.⁶ A method of definitive diagnosis of the breast lesions is therefore needed in order to reassure the patient and to offer best possible treatment.⁷ The main purpose of FNAC of breast lesions is in investigation of any palpable breast lump and to avoid unnecessary surgery. FNA can be done on palpable lesions and deep seated non palpable lesions with the help of ultrasound and mammography.⁸ It is relatively simple, reliable, economical and complication free procedure, and can be easily repeated if aspirate is inadequate.⁹ FNAC has superseded the use of frozen section examination in the diagnosis and management of patients with breast cancer and plays a major role as an important preoperative assessment tool along with clinical correlation and mammography which are referred to as the 'triple test'.¹⁰ Hence FNAC is still considered as a successful and less complicated procedure with excellent results in the diagnosis and management of patients with breast lesions. The limitation of FNAC is its inability to differentiate in situ from invasive carcinoma. Certain lesions present diagnostic difficulty even with core needle biopsy and require excision of the mass. These are spindle cell lesions, phyllodes tumour, fibroepithelial lesions with cellular stroma, papillary lesions, mucinous lesions, radial scar, atypical proliferative lesions like fibroepithelial atypia etc.¹¹ So, this study was conducted mainly to find out the cytomorphological patterns and distribution of breast lesions in various age groups.

METHODS

In the present prospective observational study, fine- needle aspiration was done on the clinically palpable breast lumps, referred from MIMS hospital to the Department of Cytopathology, Mandya Institute of Medical Sciences. The study was conducted for a period of 18 months from January 2016 to June 2017. A total of 200 cases were included in this

study. The FNAC procedure was explained to the patient in their vernacular language. A written consent was taken before performing the FNAC.

In case of minors, consent was taken from guardian. Data regarding the age of the patient, site of involvement, size of lesion and relevant clinical history were recorded. The patient was laid supine and the lump was localised by palpation. The swelling was fixed with the thumb and index finger of the left hand. The site of FNA was cleaned with a sterile swab. FNA was done using a 22 to 23-gauge needle and 10 ml disposable syringe was mounted on Franzen handle. No local anaesthesia was used for any of the patients. The needle was inserted into the lesions & negative pressure was applied by withdrawing the syringe plunger. For each lesion 2 - 4 passes were made in to and fro manner.

Material was aspirated into the hub of the needle, negative pressure was released before exiting the lesion, needle was detached from the syringe, air was taken into the plunger and the aspirated material in the needle was expelled onto the glass slides. On an average, 4 smears were prepared. Wet fixed smears were stained with haematoxylin and eosin stain and air-dried smears were stained with May-Grunwald-Giemsa stain. All the smears were examined systematically as follows: cellularity = scant / adequate / rich, background of the smears for presence of inflammatory cells, necrosis and blood, detailed study of the cytomorphology of the cell population.

Cytologically the cases were grouped according to the five tier reporting format for breast lesions (C1 – C5) laid down by National Cancer Institute. Criteria for adequacy are: For C1 category there should be at least six clusters of ductal epithelial cells on each smear comprising at least 5 - 10 cells per cluster. For C2 category, there must be no evidence of significant atypia or malignancy.

For C3 category, the aspirate can have all the characteristics of a benign aspirate. However, in addition, certain features may be present which are difficult to interpret like nuclear pleomorphism, some loss of cellular cohesiveness, nuclear and cytoplasmic changes resulting from hormonal (pregnancy, pill, hormone replacement therapy) or treatment influences, increased cellularity accompanying the above features.

For C4 (suspicious of malignancy) has been used for those aspirates with highly atypical features such that it is almost certain that they have come from a malignant lesion although a confident diagnosis cannot be made. Malignant lesions were graded using Robinson's criteria based on 6 parameters i.e. cell dissociation, nuclear size, cell uniformity, nucleoli, nuclear margins and nuclear chromatin. Histopathological examination of the available biopsies from the study was done. The biopsy specimens were fixed in 10 % formalin, paraffin embedding and stained by hematoxylin and eosin stains.

The data was collected and analysed for statistical significance using Statistical Package for Social Sciences (SPSS). Qualitative data was presented as percentages. Percentages of specificity, sensitivity, negative predictive value (NPV), positive predictive value (PPV), diagnostic accuracy and false negative and false positive rate of FNAC were also calculated.

RESULTS

The present study includes fine- needle aspirates (FNAs) from the palpable breast lesions of 200 cases spread over a period of 18 months. Out of 200 cases of breast FNAs evaluated, histopathological correlation was available for 88 cases and statistical tests were used to interpret the results. The most common presenting symptom was lump in the breast. This was observed in all the cases. Twenty cases in addition had associated pain. Two cases presented with lump and nipple discharge and five cases presented with lump and nipple retraction. One case showed evidence of redness adjacent to the mass. Two cases of lump showed surface ulceration and two cases had nipple discharge. Two cases of pain with redness were reported. Out of 200 cases, 92 cases were involving right side of breast, 96 cases were located on left side of breast and bilateral lesions were observed in 12 cases. Out of 200 cases, 117 breast lesions were firm in consistency, 71 were soft in consistency and 12 were hard in consistency. Among 160 benign cases, 62 cases were located in upper inner quadrant followed by 35 cases in upper outer quadrant. 28 cases were located in lower inner quadrant, 21 cases in subareolar region, 9 cases in lower outer quadrant and 4 cases were diffuse, involving all quadrants of breast. One case was located in both upper outer and upper inner quadrants. In the present study of 200 cases, females were most commonly affected with 182 cases accounting for 91 % and there were 18 males accounting for 9 %. The age ranged from 12 - 88 years with a mean age of 35.46 years.

The spectrum of breast lesions on cytomorphological interpretation was 1 % inadequate / insufficient material (C1), 80 % benign (C2), 1.5 % atypia / suspicious probably benign (C3), 0.5 % suspicious probably malignant (C4) and 17 % malignant (C5). In benign disease, fibroadenoma was the commonest (31 %) followed by fibrocystic change (22 %), benign epithelial hyperplasia (8.7 %), acute mastitis (3 %), chronic mastitis (2 %), epidermal cyst (1.8 %), subareolar abscess, granulomatous mastitis, galactocele (1 %) and gynaecomastia (8.5 %). Amongst the malignant group, infiltrating ductal carcinoma - not otherwise specified was the commonest lesion constituting (82.4 %), followed by mucinous carcinoma (8.8 %), papillary carcinoma, medullary carcinoma and metaplastic carcinoma (2.9 %). The specificity, sensitivity, positive and negative predictive value and diagnostic accuracy of fine- needle aspiration cytology were 100 %, 90 %, 100 %, 95 %, and 96 %, respectively. (Table 1).

The maximum number of cases were in the age group of 21 - 30 years with 60 (30.0 %) cases followed by age group of 31 - 40 years with 47 (23.5 %) cases and least common was in the age group of 81 - 90 years with 1 case (0.5 %). The lumps were located in upper inner quadrant of breast in 82 (41.0 %) cases making up the majority followed by upper outer quadrant in 48 (24 %) cases, lower inner quadrant in 31 (15.5 %) cases, subareolar region 22 (11 %) cases and lower outer quadrant in 10 (5 %) cases. In 6 (3 %) cases, lump was diffuse involving all quadrants of breast and in 1 case it was seen in both upper inner and outer quadrant.

Out of 200 cases, 160 cases were benign lesions and 34 cases were malignant lesions. Most of the benign lesions belonged to age group 21 - 30 years followed by 31 - 40 years. Malignant lesions were maximum in the age group of 41 - 50 years (Table 2). In male breast, total 18 cases were present, of which 17 cases were of gynaecomastia and 1 was of IDC-NOS. Correlation of cytological and histopathological study of breast lesions of the study population is given in (Table 5).

FNAC Categories	Diagnosis	No. of Cases	%	Overall %	
C1	Inadequate / insufficient	Scanty	2	1	1
C2	Benign breast lesions	Acute mastitis	6	3	80
		Chronic mastitis	4	2	
		Granulomatous mastitis	2	1	
		Fibrocystic change	44	22	
		Fibroadenoma	62	31	
		Benign phyllodes tumour	1	0.5	
		Benign epithelial Hyperplasia	14	8.7	
		Benign spindle cell lesion	1	0.6	
		Epidermal cyst	3	1.8	
		subareolar abscess	2	1	
		lipoma	1	0.5	
		Galactocele	2	1	
		Breast cyst	1	0.5	
Gynaecomastia	17	8.5			
C3	Atypical probably benign	Atypical ductal hyperplasia	3	1.5	1.5
C4	Suspicious for Malignancy	Suspicious of ductal carcinoma	1	0.5	0.5
C5	Malignant breast Lesion	Infiltrating ductal carcinoma	28	14	17
		Medullary carcinoma	1	0.5	
		Mucinous Carcinoma	3	1	
		Papillary carcinoma	1	0.5	
		Metaplastic carcinoma	1	0.5	
Total			200	100	

Table 1. Cytological Spectrum of Breast Lesions on FNAC

Age (Years)	Benign Lesions with Percentage	Malignant Lesions with Percentage
10 - 20	31 (19.4 %)	0
21 - 30	57 (35.6 %)	3 (8.8 %)
31 - 40	40 (25 %)	6 (17.6 %)
41 - 50	21 (13.1)	14 (41.2 %)
51 - 60	6 (3.8 %)	5 (14.7 %)
61 - 70	2 (1.3 %)	5 (14.7 %)
71 - 80	3 (1.9 %)	0
81 - 90	0	1 (2.9 %)
Total	160 (100 %)	34 (100 %)

Table 2. Age Distribution of Benign and Malignant Breast Lesions

Studies	Peak Age Group in Years
Bukhari et al	21 - 30
Rahman et al	21 - 30
Singh A	21 - 30
Khemka A	30 - 34
Present study	21 - 30

Table 3. Comparative Analysis of Age Range in Benign Breast Lesions

Study	Number of Cases (%)	Peak Age Group in Years
Singh A	8.82 %	41 - 60
Rahman MZ et al	14.17 %	31 - 40
Bukhari et al	31 %	51 - 60
Khemka A	22 %	40 - 44
Present study	17 %	41 - 50

Table 4. Comparative Analysis of Age Range in Malignant Breast Lesions

Cytological Diagnosis	Histopathological Benign	Histopathological Malignant	Total
Benign	58 (a)	3 (b)	61 (a + b)
Malignant	0 (c)	27 (d)	27 (c + d)
Total	58 (a + c)	30 (b + d)	88 (a + b + c + d)

Table 5. Correlation of Cytological and Histopathological Study of Breast Lesions

a: true negative; b: false negative; c: false positive; d: true positive.

DISCUSSION

Fine-needle aspiration cytology is widely used in the diagnosis of breast cancer because it is an excellent, safe, and cost-effective diagnostic procedure. FNAC of the breast can reduce the number of open breast biopsies.¹² Majority of benign lesions were common in age group of 21 to 30 years followed by 31 to 40 years. This finding is similar to the study done by Bukhari et al.¹² Rahman et al.¹³ Singh A¹⁴ while study done by Khemka A showed slightly higher age group (Table 3). Among total 200 cases, 34 (17 %) cases were reported as malignant lesions presenting most commonly in age group of 41 - 50 years, among which 28 (82.4 %) cases were ductal carcinoma (most common). Rahman et al.¹³ and Khemka A reported 14.17 % and 22 % of malignant cases respectively which were close to our study.

However, Singh A¹⁴ reported a lower incidence of 8.82 % while Bukhari et al.¹² reported a higher rate of 31 % cases of malignant lesions. (Table 4). In the present study, out of 200 cases, 80 % of cases were benign and 17 % were malignant. Benign lesions (160) were the bulk of breast FNAC diagnosis accounting for 80 %. These findings were similar to the findings of Rosa et al.¹⁵ Bukhari et al.¹² Feichter et al.¹⁶ and Day et al.¹⁷ (77.5 %). While Ishikawa et al.¹⁸ showed a lower percentage as compared to other studies.

Majority of the lumps were involving left breast in upper inner quadrant. This finding is similar to study done by Hussain et al.¹⁹ and Khemka A where they had shown majority of lesions involving left side of breast. Fibroadenoma was the most common benign lesion in this study with a peak incidence between 21 to 40 years followed by fibrocystic change. Similar findings were noted in study of Bukhari et al.¹² while Rahman et al.¹³ and Singh A¹⁴ showed fibroadenoma occurring in comparably younger age group. Among malignant lesions, infiltrating ductal carcinoma – not otherwise specified which is similar to study by Rahman et al.¹³ and Khemka A⁹ reported 14.17 % and 22 % of malignant cases respectively which were close to our study. Three cases were diagnosed as mucinous carcinoma by FNAC and histopathology. In the study done by S. Srikanth one case of mucinous carcinoma was reported on cytology.²⁰ In the present study of 200 cases, females were most commonly affected with 182 cases accounting for 91 % and there were 18 males accounting for 9 %. In Kalyani et al.²¹ study, percentage of female was 86 % and male was 13.2 %. which is close to our study.

CONCLUSIONS

Fine-needle aspiration cytology is an efficient, rapid, inexpensive, safe and reliable diagnostic method. It causes minimum morbidity with very less complications and has excellent patient acceptance. It helps to take the decision for the mode of surgery. Despite of its few limitations, FNAC has got high levels of diagnostic accuracy when performed by experienced pathologist. The high specificity and a high negative predictive value for malignancy illustrated the high

accuracy of FNAC in the diagnosis of malignancy in the breast.

Therefore we conclude that the diagnosis of breast lesions based on FNAC should be practiced as a routine procedure as there is high degree of correlation with histopathological findings. Thus, FNAC is an effective valid tool as the first line diagnostic modality in the preoperative diagnosis and management of both benign and malignant breast lesions. In our study we found that benign lesions were more common than malignant lesions with a peak incidence in the 2nd and 3rd decade. Malignant lesions were common in the 41 - 50 years age group. Left breast was most commonly involved. 91 % were female patients. Most common benign lesion was fibroadenoma and the most common malignant lesion was infiltrating ductal carcinoma - not otherwise specified.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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