



## The Role of Fine Needle Aspiration Cytology (FNAC) in The Diagnosis of Benign and Malignant Breast Lump

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### ABSTRACT

**Background:** Fine needle aspiration cytology (FNAC) is consider as an easy and simple procedure and technique for disease diagnosis in different parts or body organs including breast. Any breast mass or cyst, either benign or malignant can be evaluated by clinical examination, ultrasound, mammography, and FNAC before operation done and biopsy taken. Fine needle aspiration can be done by using different gauge needle for sample collection from the mass or the lesion for microscopic cytological evaluation, and it provide rapid minimal invasive diagnosis for the lesions.

**Objectives and Methods:** A prospective study used here and applied on 100 females came from January 2022 to September 2022 in Azady teaching hospital and private laboratories in Kirkuk city. In this study I focused on all different types of breast masses , their size, ultrasound reports, and the patient's age, with any abnormal changes in the cytology. I presented the data as percentage mainly after analysis of data to assess associations, and the chi-square test used.

**Results:** By using fine needle aspiration cytology for breast mass and cyst to determine cellular abnormalities including simple breast cyst, benign breast lump as fibroadenoma and fibrocystic disease, or malignant breast lump as invasive ductal carcinoma, and their frequency and relation with patient's age. The result cases percentage was the following, the highest percentage was 54% for benign fibrocystic disease, 24% for benign fibroadenoma, 12% for simple cyst, and the lowest percentage was 10% for breast carcinoma. The age group was range from 20 years old to 70 years old. The benign cases of fibroadenoma was mostly within young age group (20-30) years old, fibrocystic disease and simple cyst include almost all ranges of age group, and the malignant lesions was within old age group (50-70) years old.

**Conclusion:** Fine needle aspiration cytology done for female with breast mass or cyst in an acceptable percentage. Benign fibrocystic disease was the highest percentage and the largest number within the all cases, fibroadenoma was more than simple breast cyst, and breast carcinoma was the lowest number of cases that detected..

### Keywords:

Fine needle aspiration cytology, benign, malignant breast mass.

### Introduction

Breast mass can be either benign or malignant. Benign breast tumor composed of many variety include fibroadenoma and fibrocystic disease. Fibroadenoma consider as the most common

tumor of breast in adolescent and young female as a median age of 25 years, but it can occur at any age.<sup>1,2</sup> It appear grossly as a well circumscribed, ovoid, firm mass with a slit –

like spaces on cut section surface, and it can be calcified with fibrotic or mucoid appearance. On microscopic examination it show proliferation of stromal and glandular component which are either intracanalicular or pericanalicular pattern with intact myoepithelial cell layer, and the stromal component show uniform cellularity of spindle cells, collagen, myxoid changes or hyalinization with no atypia. It has many variants including myxoid, complex, cellular and juvenile fibroadenoma. On cytological examination it show epithelial clusters or sheets of two population components including naked nuclei and stromal spindle cells.<sup>2,3</sup>

Fibrocystic disease consider as a very common benign type of breast tumor affecting about 50% of women during reproductive age mainly 25-45 years old, and decrease incidence in postmenopausal female. Grossly it appear as a heterogeneously fibrous tissue, fatty and cysts of different sizes.<sup>4,5</sup> On microscopic examination it characterized by three main features which are fibrosis, adenosis and cyst formation. Fibrosis include stromal fibrosis, areas of increase density, and inflammation as a result of cyst rupture. Adenosis include increase number of acini per lobule, and it seen frequently in pregnancy, and in non- pregnant it may be focally appear. Cyst formation means cystically dilated lobules or ducts and lined by simple cuboidal epithelium, may be with apocrine metaplasia, and may contain eosinophilic material secretion.<sup>5,6</sup> On cytological examination it appear as sheets and clusters of ductal epithelial cells without nuclear overlap apocrine cells and foam cells.<sup>6</sup> Malignant breast tumor composed of many variety include invasive ductal and lobular carcinoma. Invasive ductal carcinoma is the commonly diagnosed carcinoma if female as about 24% of all carcinoma types, and it is a leading cause of death by cancer worldwide. The majority of the cases are sporadic, and about 5-10 % are hereditary with cancer susceptibility genes.<sup>7,8</sup> Grossly the malignant

In this study I used prospective study on 100 females came from January 2022 to September 2022 in Azady teaching hospital and private

mass poorly circumscribed, irregular, nodular configuration, firm, hard on palpation with gritty feel on cutting. On microscopic examination it show wide range of variety of malignant cells arrangement pattern including sheets, cords, clusters, nests and individual cells.<sup>7</sup> Histological grading based on the Nottingham/ modified Bloom and Richardson Score that depend on tubular formation, nuclear pleomorphism and mitotic count.

Tubular formation (1-3 points) given as following: > 75% (1 point), 10-70 % (2 points), <10% (3 points). Nuclear pleomorphism (1-3 points) given as following: uniform, regular, small cells (1 point), variable, moderate enlargement (2 points), marked variation, large nuclei with prominent nucleoli (3 points). Mitotic count (1-3 points) depending on number of mitotic activity that found in microscopic field areas. The total score obtained by the sum of the points from tubular formation, pleomorphism and mitotic activity, and the result will be as following: 3-5 points consider grade 1, 6-7 points is grade 2, and 8-9 points is grade 3. On cytological examination the smear show cellular enlargement and pleomorphism with prominent nucleoli, cellular dyscohesion and some time show mitosis.<sup>8,9</sup>

Invasive lobular carcinoma comprises about 10% of breast malignancy and the mean age at diagnosis is 60 years, and it is more frequently bilateral and multicentric. Grossly it is frequently ill defined border, discrete irregular mass. On microscopic examination the cells arranged in cords, single files and single cells. The tumor cells are small, monomorphic, discohesive and mainly no marked atypia. The cells can arranged also as solid sheets or nests, alveolar pattern as clusters and aggregates of more than 20 cells, and the cells may show pleomorphism and cellular enlargement. On cytological examination, the cellularity can be low, and the cells arranged in chains, single files or even as single cells.<sup>10</sup>

### Methods

laboratories in Kirkuk city. For each patient I did fine needle aspiration by using different gauge needle for sample collection from the

mass or the lesion under ultrasound guide.

The aspirated material was put on slides that was put in 100% ethyl alcohol solution for fixation at least 24 hours, and the slides were labeled with code number of each patient. The slides then pass through multiple steps for staining, starting from three concentrations of ethyl alcohol 95%, 75% and 50% respectively, then hematoxylin and eosin stains, then

## Results

In this study 100 patients were examined who underwent fine needle aspiration from breast mass January 2022 to September 2022. The age group was range from 20 years old to 70 years old, (mean  $\pm$  standard deviation (SD) = 37  $\pm$  8). The result cases percentage was the following, the highest percentage was 54% for benign fibrocystic disease, 24% for benign fibroadenoma, 12% for simple cyst, and the

dehydration steps by 50%, 75%, and 95% - 100% ethyl alcohol respectively, and finally xylene and cover slides.

After preparing the slides, all of them were examined by histopathologists cytologically and reported with their relation with patient's ages, and following them after operation and histopathological examination of the mass and confirming the diagnosis that given by cytological examination.

lowest percentage was 10% for breast carcinoma.

The benign cases of fibroadenoma was mostly within young age group (20-30) years old, fibrocystic disease and simple cyst include almost all ranges of age group, and the malignant lesions was within old age group (50-70) years old. As shown in table 1.

Table 1: The percentage of the cases and their age groups.

Breast lesion	Percentage	Age group
Fibroadenoma	24%	20-30
Fibrocystic	54%	All range age group
Simple cyst	12%	All range age group
Breast carcinoma	10%	50-70

## Discussion

Fine needle aspiration is a minimum invasive procedure to take cells or sample from any mass, cyst or fluid aggregate for diagnosis or treatment guide. It is more save, simple and cheaper than incisional or excisional biopsy. It can be used on almost any region in the body where there is tissue or fluid needed to be diagnosed to aid treatment. This include determining inflammatory cells and help treating abscess, benign cells, dysplastic cells and determining the degree of dysplasia either mild, moderate, or sever, and also detecting any malignant cells and determining either it is primary or metastatic from other organs.

Fibroadenoma is a benign breast lesion and it can diagnosed by fine needle aspiration, and this is very important for this common lesion to be diagnosed by this simple, minimum invasive method to avoid invasive surgery and treat the patient conservatively. On cytological examination the smear could show hypercellularity, cellular aggregates and staghorn epithelial configurations, numerous bare nuclei, and stromal fragments.

Fibrocystic disease of breast is considered as a very common lesion within female, and in spite of it is a benign lesion but it can develop to premalignant and even malignant lesion, and as the lesion is not well circumscribed as fibroadenoma, it can be suspicious for malignancy on examination, so fine needle aspiration is playing an important role in the diagnosis strategy for the patient and guiding treatment. On cytological examination the smear shows clusters and sheets of ductal epithelial cells and myoepithelial cells, some times mixed with macrophages, apocrine cells may be seen as round nuclei, eosinophilic cytoplasm, and distinct nucleoli. The cystic component of fibrocystic disease varies in size, and may present as a large cystic dilatation and mistaken clinically as a simple cyst, but on aspiration and cytological examination the smear shows small aggregates of ductal epithelial cells and myoepithelial cells, may show also macrophages and inflammatory cells, and this confirms the diagnosis of fibrocystic disease and not only a simple cyst. The smear may show also aggregates of atypical ductal epithelial cells that can be diagnosed as atypical ductal hyperplasia within the fibrocystic disease, or even premalignant cases can be detected.

Breast carcinoma is a very serious condition that is considered as a very common leading cause of death within female all over the world. The lesion in breast carcinoma can be of any size, so it can be small and painless, so the patient refuses any invasive surgical procedure for diagnosis, so the best alternative simple way is fine needle aspiration cytology for the diagnosis and starting treatment without wasting time, because time will be very important in these cases, as the diagnosis will be at early stages and can be treated properly, before the cancer becomes advanced or metastasizes and even the treatment will be aimless.

On cytological examination of invasive ductal carcinoma, which is the most common type of breast carcinoma, the smear shows individuals or loose aggregates of ductal epithelial cells that are pleomorphic in size and shape, large

nuclei with pleomorphism and focal hyperchromasia, high N/C ratio, prominent nucleoli, and mitotic activity may be seen. On cytological examination of lobular carcinoma the smears show small cells with minimum pleomorphism and no high N/C ratio, and the cells appear as small files or chains or even as small cells.

In many countries the mortality rate is still high from breast malignancy may be because of low effective control measures of routine breast examination for every female in these countries, low health educations, and in effective health care centers. So it is important to have well controlled breast screening programs, including clinical examination, ultrasound, mammography, and fine needle aspiration for any mass or cyst found that make it possible to detect and diagnose any carcinoma at early stage and treat it properly.

### Conclusion

The diagnosis that made by fine needle aspiration under ultrasound guide was more accurate, sensitive and specific than other cases done without ultrasound guide, and it helped in the diagnosis of these cases in this study in early time especially the malignant cases, also it differentiated between simple cyst and the cysts that was part of fibrocystic disease.

It is important to have well controlled breast screening program with a high technology and team work, including females education about self examination of breast as in primary health care center, a routine clinical examination, ultrasound examination, mammography, and fine needle aspiration under ultrasound guide for any detected breast lesion or mass.

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