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## Sensitivity of ultrasonography in predicting benign and malignant masses of breast lump at a tertiary care hospital with its cytological and histological correlation

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### Abstract

**Introduction:** Worldwide, breast cancer is the most-common invasive cancer in women. It affects 1 in 7 (14%) of women worldwide. Breast cancer comprises 22.9% of invasive cancers in women and 16% of all female cancers the number of cases worldwide has significantly increased since the 1970s, a phenomenon partly attributed to the modern lifestyles. Breast cancer is strongly related to age with only 5% of all breast cancers occurring in women under 40 years old. Breast cancer screening is the medical screening of asymptomatic, apparently healthy women for breast cancer in an attempt to achieve an earlier diagnosis. The assumption is that early detection will improve outcomes. A number of screening tests have been employed, including clinical and self-breast exams, mammography, genetic screening, ultrasound, and magnetic resonance imaging. Supplemental screening ultrasound has the potential to depict early, node-negative breast cancers not seen on mammography, and its performance is improved, if anything, in dense parenchyma. Methods that improve detection of small, node-negative cancers should further reduce mortality when performed in addition to screening mammography.

**Materials and Method:** This is a retrospective study spanning over a period of 1 year including females in the age of 15 – 80 years presenting with palpable breast lumps. All the females were examined clinically, radiologically with aid of ultrasonography, followed by cytopathological examination and following the excision of mass correlation with histopathological diagnosis. A concordance was determined between the radiological, cytopathological and histopathological diagnosis to find the utility of ultrasonography in detecting lesions.

**Observation:** In this study we found that using an investigation tool that is ultrasonography the sensitivity of detecting a lesion correctly as benign or malignant lesions, which is confirmed with histopathology and preliminary on cytopathology is 78.48%.

**Conclusion:** Breast cancer is a serious health hazard to millions of females and requires early detection for early diagnosis and treatment. Triple test in itself is an excellent diagnostic approach. However, in a setting due to lack of mammography a subjunctive tool like ultrasonography can help in assisting the diagnosis of breast lesions.

**Keywords:** Ultrasonography, predicting benign, malignant masses, cytological, histological

### Introduction

Invasive breast cancer is the most common carcinoma in women. Accounting for 23% of all cancers in women globally and 27% in affluent countries, it is more than twice as common as cancer at any other site <sup>[1]</sup>. As with most epithelial tumours, the incidence of breast cancer increases rapidly with age. The prognosis for patients with this disease is very good if it is detected at an early stage. The origin of breast cancer is multifactorial and involves diet, reproductive factors, and hormones. The etiological journey begins in utero and continues throughout life with a variety of exposures modulating risk at different times <sup>[2]</sup>. Mammography is the baseline imaging method for the detection of breast cancer in women aged > 40 years. Invasive breast cancer is most commonly manifested on mammography as an ill-defined or spiculated mass, with or without associated calcifications, but can also present as architectural distortion, focal asymmetric density or calcifications alone. Ultrasound can be added to improve sensitivity in women with mammographically dense breasts<sup>3</sup>. Mammography is rarely helpful in younger women and its use in women aged < 40 years is confined to those with proven breast cancer. Ultrasound alone is the method of

choice for imaging the breast in women aged < 40 years [3]. Magnetic resonance imaging (MRI) is the most sensitive method for detecting breast cancer, but its use is confined to screening women at very high risk (e.g. carriers of mutations in the BRCA1 or BRCA2 genes) and local staging of certain breast cancers. Imaging should always be used to assess both breasts before any treatment is implemented. Mammography and ultrasound are complementary for the pre-treatment assessment of the size, extent and presence of multifocality of breast cancer. Ultrasound is also used routinely to assess the axilla at the time of presentation, with biopsy of any abnormal lymph nodes. A palpable mass is the most common clinical sign of invasive breast carcinoma, although skin retraction, nipple inversion, nipple discharge – and less commonly, a change in the size or shape of the breast or a change in the colour or texture of the skin – may also be seen [4]. About 5–15% of palpable cancers are not seen on mammogram. The majority of these will be identified with targeted ultrasound. The false-negative rate of combined mammography and ultrasound is quite low, ranging from 0% to 3% [5]. When the results of the physical examination, mammography, and needle biopsy are all benign and concordant, the risk of malignancy is extremely low. However, if any one of these modalities is non-concordant or cannot be evaluated, surgical biopsy is indicated. Fine-needle aspiration (FNA) biopsy of the breast was first used in the 1930s by Martin and Ellis and by Stewart at Memorial Hospital, followed in the late 1940s and early 1950s by Adair and Godwin. FNA being increasingly used to complete the triple test in clinically and radiographically appearing benign breast cases. Moreover, FNA can also quickly and accurately establish a specific diagnosis of a variety of benign breast lesions, such as fibrocystic change, fibroadenoma, subareolar abscess, abscess, and lactating adenoma. In addition, FNA biopsy is also still being used to confirm the diagnosis of locally advanced and/inoperable breast carcinoma and locally recurrent or metastatic breast cancer. Fine-needle aspiration biopsy of the breast is a diagnostically accurate procedure, having an average sensitivity of 87% (range of 72–99%), specificity of 98–100%, negative predictive value of 87–99%, and efficiency of 89–99% [6-8]. The accuracy rate of FNA biopsy increases when the cytopathologist performs the FNA biopsy and uses immediate assessment to guide specimen adequacy. The false-negative rate varies from 1 to 31%. An increased false-negative rate is often related to inexperienced aspirators and technical errors. Breast masses smaller than 1 cm have a false-negative rate with a range of 6–24%, whereas tumors larger than 4 cm have a high false-negative rate due to necrosis, cystic degeneration, or hemorrhage. Carcinomas that have the highest potential for a false-negative diagnosis include those showing extensive fibrosis or extracellular matrix (therefore decreased numbers of malignant cells) and those with cells having relatively bland cytologic features. The College of American Pathologists reported a retrospective assessment of breast

FNA biopsy as part of their Q probes quality assurance program.80 More than 13 000 FNA biopsy specimens of the breast from 294 institutions were reviewed [9]. Eighty-two percent of the cases were satisfactory for evaluation, with one third having histologic correlation that served as the basis for determining diagnostic accuracy. In this retrospective review, the sensitivity of the procedure compared quite favorably with results reported by “expert” cytopathologists. Diagnostic errors with subsequent inappropriate clinical decisions can be best avoided if clinicians use the so-called triple (triplet) diagnostic procedure of clinical examination, mammography, and FNA cytology, which increases the accuracy for the diagnosis of breast cancer. Diagnostic errors with subsequent inappropriate clinical decisions can be best avoided if clinicians use the so-called triple (triplet) diagnostic procedure of clinical examination, mammography, and FNA cytology, which increases the accuracy for the diagnosis of breast cancer. Although palpation, mammography, and FNA biopsy have their limitations, the combination of all three procedures has a cumulative very high diagnostic sensitivity and specificity. FNA biopsy along with mammography and clinical examination has a diagnostic accuracy exceeding 99% for breast carcinoma when all three procedures are in agreement, while cancer was found in less than 2% of the cases when all the parameters were interpreted as benign. Therefore, clinical decisions should be based on all three parameters rather than exclusively on the FNA results. Layfield and others believe that patients with discordant triplet result should undergo open biopsy [10]. Patients with discordant or positive triplet results would obviously have tissue confirmation with either CNB or intraoperative frozen section at the time of definitive treatment.

**Aims & Objective:** The aims and objective if this study is to find the accuracy of ultrasonography as an imaging modality in correctly detecting benign and malignant mass lesion of breast across all age groups of females.

**Methodology:** This is a retrospective study design in which females presenting to surgical out door patient units with history of breast lump were first subjected to primary physical examination followed up with ultrasonographic evaluation of lump with a preliminary diagnosis. These females were then posted for FNA biopsy procedure for further evaluation and further diagnosis. Post excision these lesions were histopatologically given as final diagnosis, histopathological correlation was done and concordance in all the diagnosis was found to find the accuracy of ultrasonography.

**Study Duration:** This retrospective study design which spanned over a period of one year.

**Sample size:** All the females who reported with palpable breast lumps in the study duration were evaluated.

Females of all age groups

	Females of all age groups			Females of <40 years of age		
	Radiological Interpretation	Cytopathological Interpretation	Histopathological Interpretation	Radiological Interpretation	Cytopathological Interpretation	Histopathological Interpretation
Benign	36	39	42	33	36	34
Malignant	43	39	36	11	08	10

**Observation:** In this study a total of 79 cases were evaluated. In w which on radiological assessment 43 cases were suspected to be malignant and 36 cases were found to be of benign etiologies. On following up these cases with FNA biopsy 39 cases were found malignant and 39 cases were found to be of benign etiology out of which 4 were of inflammatory etiology and no opinion can be given. On histopathological after excision of these lumps 36 cases were found to be of malignant etiology 42 cases were benign etiology among which 3 were inflammatory lesion and in 1 case no opinion was given. 63 cases were corelated with same histopathological and cytopathological diagnosis, while concordance with ultrasonography suggested etiology was found in 62 cases. In 17 cases which did not show concordance 10 cases had ambiguity because of histopathology and cytopathological ambiguity and 07 cases showed as a result of ultrasonography mismatch. A sensitivity of 78.48% was found if ultrasonography suggested diagnosis was compared with the final interpretation.

Using this study to find the sensitivity of ultrasonography in females less than 40 years of age radiology suggestive benign etiology was found in 33 cases while 11 cases were malignant. On cytopathological examination 32 cases were likely to be of benign etiology out of which 4 were of inflammatory causes and 08 were of malignant etiology. On following up all the cases with excision biopsy and subsequent histopathological examination 34 cases were benign and 10 cases were of malignant type. Histo-cytopathological correlation was found in 36 cases while concordance with ultrasonographic suggested diagnosis was found in 35 cases. Sensitivity was found to be 79.54% when ultrasonographic suggested diagnosis was compared with the final histopathological report.

### Discussion

Ultrasonography is a good adjunct to the triple test which employs the use of mammogram along with clinical suspicion and FNA biopsy. However, in case of females less than 40 years of age where the breast is fatty and mammogram is not reliable ultrasonography is used preferentially. In our study we used ultrasonography as the radiographic modality to assess breast lesions along with clinical suspicion, cytopathological diagnosis and histopathological confirmation. In the study we found the sensitivity of ultrasonography in detecting lesions as 78.48% across age groups of 15-80 years and 79.54% when only females less than 40% was found.

Comparing with other studies of, Tan KP *et al.* <sup>[11]</sup> where sensitivity was 82% and Rupali Sood *et al.* <sup>[12]</sup> where sensitivity was 80.1%, we found our sensitivity to be comparable. In this study we also found ultrasonography to be more sensitive towards breast lesions compared to mammograms which are more specific.

### Conclusion

There is an ever-increasing burden of breast cancer in the current scenario and the mammogram though it is a good tool is often unavailable at low resource setting hence ultrasonography can be used as a adjunctive tool coupled with FNA biopsy for primary detection of the lesion. Understanding the limitation of ultrasonography being user dependent tool and same with FNA Biopsy reporting it is

best to be used in a clinical setting where clinical, radiological and cytopathological correlation is done.

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