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DIAGNOSTIC ACCURACY OF MAMMOGRAPHY IN PATIENTS WITH PALPABLE BREAST LUMP BY USING BIRADS SCORE

General Surgery

Dr. Manjunath R D Assistant professor, Dept., of General Surgery, MMC&RI, Mysore 57001

Dr. Manoj H* Junior Resident, Dept., of General Surgery, MMC&RI, Mysore 57001 *Corresponding Author

Dr. Supritha S Senior Resident, Dept., of General Surgery, MMC&RI, Mysore 57001

Dr. Subramanya M U Junior Resident, Dept., of General Surgery, MMC&RI, Mysore 57001

ABSTRACT

Background and objectives Various radiographic modalities are readily available to identify lesions that are suspicious for breast cancer. Mammography remains the mainstay of breast cancer screening. This study was aimed to determine the diagnostic accuracy of mammography in evaluating breast lumps. **Methodology** The present one and half year cross-sectional study was conducted from March 2021 to September 2022 on a total of 58 eligible women presenting with palpable breast lump in the Department of General Surgery, MYSORE MEDICAL COLLEGE AND RESEARCH INSTITUTE, MYSURU. **Results** In the present study commonest age group was between 46 to 60 years with 43.37% of the patients the nipple discharge was present in 12.06% of the cases. The shape of the lesion was found to be globular in 37.93% and tenderness was present in 43.10% of the patients. The nipple examination revealed retracted nipples in 15.51% of the patients. The consistency of the breast lump was firm in 55.17% of the patients. Axillary lymph node was present in 24.13% of the women. Mammography findings revealed grade 5 breast lump in 27.58% of the patients. Malignant lesions were diagnosed in 60.41% of the patients while 39.65% of the women were diagnosed as having benign lesions. **Conclusion and interpretation:** Of the 35 patients who had malignant lesions on histopathology/cytology, 32 had malignant lesions on mammography and 3 women had benign lesions. The sensitivity of mammography compared to histopathology/cytology in predicting malignant lesions was 91.42% with specificity of 91.30% and the diagnostic accuracy was 91.37%.

KEYWORDS

Breast cancer, Cytology, Histopathology, Mammography, Palpable breast lump,

INTRODUCTION

A benign breast condition often causes a lump. It may or may not feel tender. One might find it during daily activities. The younger the age, the more likely it is that a single breast lump will be benign. The most common benign breast lumps are fibroadenomas and a combination of fibrosis and cysts that is sometimes called *fibrocystic changes*. It is commonly encountered in surgical practice.[1]

Lumps and other changes must be examined to make sure they are not signs of breast cancer, regardless of the age of the woman. There is a potential that a single lump, especially in a younger woman, could be breast cancer even if the majority of lumps aren't. The major cause of cancer-related mortality in women is breast cancer, which is the most often diagnosed female malignancy worldwide.[2]

It is the primary cause of mortality for women between the ages of 40 and 59 and the second most frequent malignancy among all female age groups in the US. The total lifetime risk of acquiring breast cancer is 1 in 6. (1 in 8 for invasive disease). 3 Screening for early diagnosis is a crucial component of the fight against this cancer because of the severity of the condition, its psychological effects, and associated morbidity and mortality.

Breast cancer mortality has shown a decline since 1975,[4] which may be attributable to both early diagnosis by virtue of screening mammograms and improvements in adjuvant therapies.[5] Breast lumps must be taken into consideration along with any other symptoms a woman may be experiencing. The majority of them necessitate a triple assessment, consisting of a clinical evaluation, radiological imaging, and a histological analysis. Mammography mass screening programmes have the potential to lower mortality rates by facilitating early detection.

Even though a number of radiographic techniques are easily accessible to spot lesions that may be breast cancer, mammography is still the gold standard for breast cancer screening. Because it may be able to clarify aspects of a suspected lesion, the breast sonogram's function is primarily limited to the diagnostic follow-up of a mammographic abnormality. Magnetic resonance imaging (MRI) has a developing function in the early detection of breast cancer; at the moment, high-risk patients are the only ones who can be screened using MRI in conjunction with mammography.

The best test for finding breast cancer is mammography. Since 1960, it has been used to look into breast masses. Before a woman or her doctor can feel it, a mammography will show an anomaly that could be breast cancer. A breast lump is felt by the patient when breast cancer has progressed to the point that physical symptoms and indicators are present (usually painless). The diagnostic efficacy of mammography has been assessed by numerous researchers. The reported range of diagnostic accuracy is 60 to 90 percent. In elderly women with dense breasts, mammographic sensitivity for breast cancer increases independently and decreases noticeably with breast density. Independent of breast density, hormonal state has no appreciable impact on the efficacy of screening.[6] There are findings, meanwhile, that suggest mammography can also result in overdiagnosis and overtreatment. The negative effects of unneeded therapy could outweigh any potential advantages since screening tends to identify slow-growing tumours (length bias). The numerous evaluations are an indication of the controversy around mammography screening and the lack of clarity concerning its effects on women of different ages. Varying nations have very different screening policies, with some refraining from implementing screening in part due to the lack of a confirmed decrease in all-cause death.

One cause for concern is the possibility that low-risk women who receive radiotherapy, such as those whose tumours are discovered during screening, will die from all causes earlier due to unfavourable cardiovascular effects. There is also worry that the cause of death has not been determined objectively during the trials. Finally, although less than half of instances may develop to be invasive, carcinoma in situ is considerably more likely to be found using mammography, and these women will still be treated with surgery, medications, and radiotherapy. Additionally, the diagnostic efficacy of mammography in the context of our hospital system has not yet been evaluated.

Considering the conflicts regarding the diagnostic accuracy and recommendations and the scarcity of data regarding the accuracy of mammography in our hospital set up this study was planned to determine the diagnostic accuracy of mammography in evaluating breast lumps.

AIMS AND OBJECTIVES

1. Correlation of clinical examination, mammography and histo-pathological findings in patients presenting with breast lump.
2. To determine sensitivity and specificity of mammography.

3. To determine positive predictive and negative predictive value of mammography in palpable breast lumps.

METHODOLOGY

This study was conducted in the Department of General Surgery, MYSORE MEDICAL COLLEGE AND RESEARCH INSTITUTE, MYSURU over a period of one and half years from March 2021 to September 2022.

Study design

The study design was cross-sectional study.

Study period and duration

The present study was conducted for the period of one and half years from March 2021 to September 2022.

Place

The present study was carried done in the Department of General Surgery MYSORE MEDICAL COLLEGE AND RESEARCH INSTITUTE, MYSURU.

Source of Data

All women patients with palpable breast lump attending surgical OPD/admitted at Department of General Surgery, MYSORE MEDICAL COLLEGE AND RESEARCH INSTITUTE, MYSURU were studied.

Sample size

A total of 58 patients with palpable breast lump were studied.

Selection criteria

Inclusion criteria

- Patients aged between 15 to 75years.
- Palpable breast lump of variable duration.

Exclusion

- Patients not willing for mammography/ biopsy.
- Patients with infective breast masses.
- Patient not willing to participate in the study.

Ethical clearance

Prior to the commencement, the study was approved from the Ethical and Research Committee, MYSORE MEDICAL COLLEGE AND RESEARCH INSTITUTE, MYSURU.

Informed Consent

The patients fulfilling selection criteria were informed about the nature of the study and a written informed consent was obtained before enrollment.

Method of collection of data

Patients were interviewed and demographic data such as age and presenting symptoms were noted. Further these patients were subjected to thorough clinical examination. Brest examination was done and variables like discharge, size, shape, tenderness, consistency and axillary lymph node were assessed. These findings were recorded on a predesigned and pretested Proforma.

Investigations

Patients underwent the following investigations.

- Mammography
- Biopsy

Procedure

Mammography

- Patients were asked to remove any clothing, jewelry, or other objects that might interfere with the procedure.
- The technologist confirmed the lumps or other changes in either breast. an adhesive marker was placed on the spot(s) prior to the procedure.
- An adhesive marker was also applied to moles, scars, or other spots that might interfere with the breast image.
- Patients were made to stand in front of a mammography machine and one breast was placed on the X-ray plate.
- A separate flat plate, made of plastic, was brought down on top of the breast to compress it gently against the X-ray plate.
- Compression of the breast was required in order to minimize the amount of radiation used and to ensure optimal visualization of the breast tissue.
- Patient was asked to hold her breath while the image was being taken.
- The radiologic technologist stepped behind a protective window while the image was taken.
- Two pictures cephalo-caudal and lateral views were taken of each breast, requiring the breasts to be repositioned between pictures.
- After the X-rays have been taken, the films were examined by radiologist to ensure that the films are clear and that no additional films are needed. All the mammograms were evaluated by a single expert radiologist to rule out the interobserver variability.
- If there was any question about any of the films, additional films were taken.
- The examination process took approximately 20 to 30 minutes. Grading of mammographic findings

Histopathology / Cytology report

Depending upon the triple assessment viz. clinical examination, mammography and FNAC/core biopsy patients received treatment.

When the triple assessment indicated benign lesion, the lump was excised, the malignant lesions were treated according to the stage of the disease. HPR was available in both these groups of patients, when there was no indication for surgical excision, FNAC or core biopsy findings were taken for calculation of sensitivity and specificity.

Statistical analysis

The data obtained was coded and entered in Microsoft Excel Spreadsheet. The categorical data was expressed as rates, ratios and percentages and comparison was done using chi-square test. Continuous data was expressed as mean ± standard deviation. The diagnostic accuracy of mammography in predicting breast lumps was determined by sensitivity, specificity, positive predictive value and negative predictive value. Kappa agreement was used to correlate the agreements between diagnosis. A 'p' value of less than or equal to 0.05 was considered as statistically significant.

RESULTS

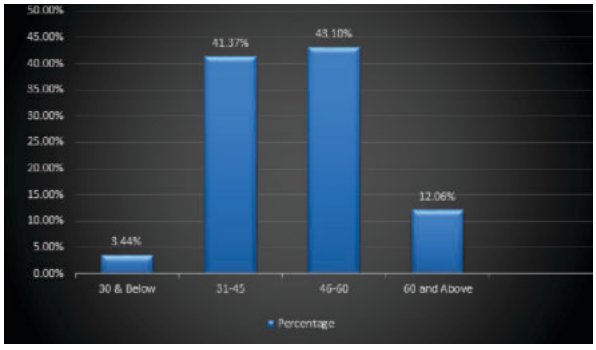
This one and half year cross-sectional study was conducted from March 2021 to September 2022. A total of 58 eligible women presenting with palpable breast lump in the Department of General Surgery, MYSORE MEDICAL COLLEGE AND RESEARCH INSTITUTE, MYSURU were studied.

The data obtained was tabulated on excel spread sheet (Annexure IV). The data was analysed and the final results were tabulated as below:

- In the present study 43% of the women presented with age between 46 to 60 years followed by 60 and above (12.06%), 31 to 45 years (41.37%) and 2 were below 30 yeas of age[Table:1;Graph: 1]
- Nipple discharge was present in 12% of the patients. [Table: 2; Graph: 2]
- Shape of the lesion was globular in 37.93%, irregular in 32.75%, oval in 17.24%, pea nut in 12.06%. [Table: 3; Graph: 3]
- .In this study the nipple examination revealed retracted nipples in 16% of the patients. [Table: 4.; Graph: 4]
- Tenderness was present in 43% of the patients. [Table:5; Graph:5]
- The consistency of the breast lump was firm in 55.17% of the patients while hard in 44.82%. [Table: 6 ; Graph: 6]
- The axillary lymph nodes were palpable in 24.13% of the patients[Table: 7; Graph:7]
- In this study, based on the breast examination, the clinical diagnosis was malignant breast lump in 53.44% of subjects and benign in 46.55% of patients, whereas, mammography findings revealed BIRADS grade 5 breast lump (high suspicion of malignancy) in 27.58% of the patients[Table: 8&9.; Graph: 8&9]
- In the present study 60.41% of the patients were diagnosed to have malignant lesions while 39.65% of the women were diagnosed as having benign lesions, based on Histopathological examination [Table: 10.; Graph: 10]

Table 1: Age distribution

Age	No of Respondents	Percentage(%)
30 & Below	2	3.44
31-45	24	41.37
46-60	25	43.10
60 and Above	7	12.06
Total	58	100



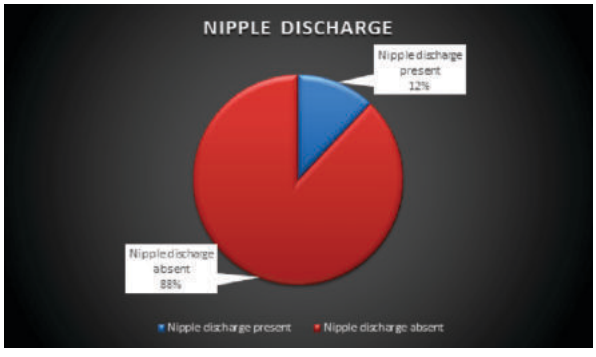
Graph 1: Age distribution

Graph 1:

Bar diagram showing the age distribution of the study subjects. 43.10 percent of the women presented with age between 46-60 years, 12.06 percent above 60 years of age and 41.37% between 31-45 years

Table 2: Nipple Discharge

Discharge	Present	Absent	Total
No of Respondents	07	51	58
Percentage	12.06%	87.93%	100%



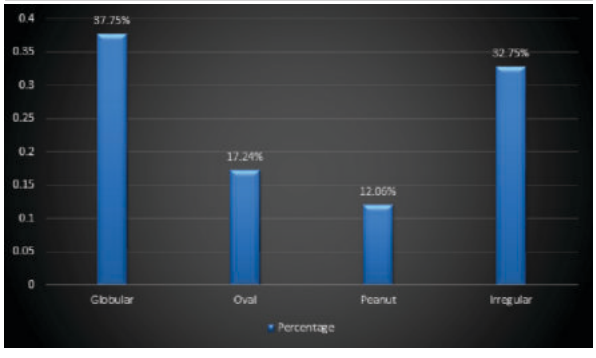
Graph 2: Nipple Discharge

Graph 2:

Pie-diagram representing the percentage of study subjects who had nipple discharge at the time of presentation. In our study it was found that nipple discharge was present in 12.06% of the patients.

Table 3: Shape of the lump

Shape	Globular	Oval	Peanut	Irregular	Total
No of Respondents	22	10	07	19	58
Percentage	37.93%	17.24%	12.06%	32.75%	100%



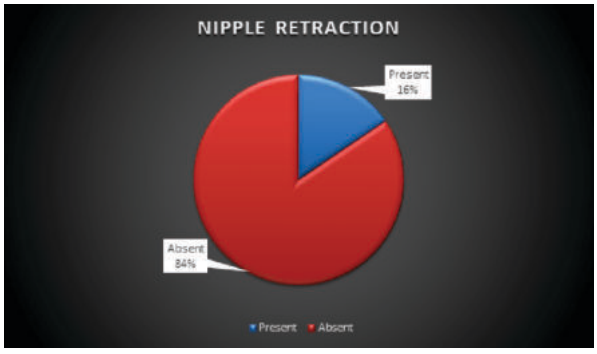
Graph 3: Shape of the lump

Graph 3:

Bar graph representing the percentage of study subjects presenting with lumps of the above mentioned various shapes. With globular in 37.75%, irregular in 32.75%, oval in 17.24% and peanut in 12.06%.

Table 4: Nipple Retraction

Finding	Normal	Retracted	Total
No of Respondents	49	09	58
Percentage	84%	16%	100%



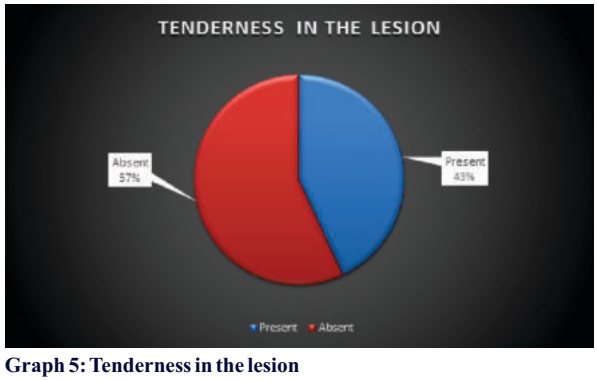
Graph 4: Nipple Retraction

Graph 4:

Pie diagram showing the percentage of study subjects presenting with retraction of the nipple, with 16% of the cases showing retraction.

Table 5: Tenderness in the lesion

Findings	Present	Absent	Total
No of Respondents	25	33	58
Percentage	43.10%	56.89%	100%



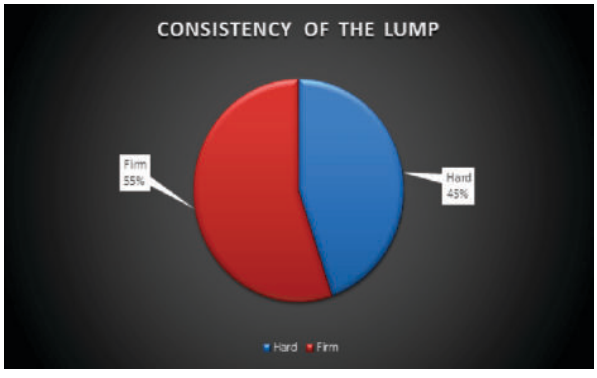
Graph 5: Tenderness in the lesion

Graph 5:

Pie diagram showing the percentage of study subjects who had nipple retraction at presentation, tenderness was found in 43.10% of the lesions

Table 6: Consistency of the lump

Consistency			
Findings	Firm	Hard	Total
No of Respondents	32	26	58
Percentage	55.17%	44.82%	100%



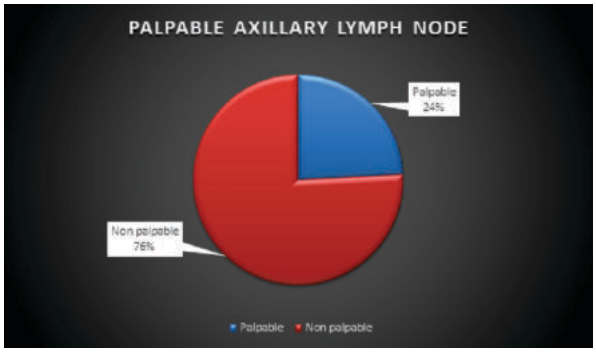
Graph 6 : Consistency of the lump

Graph 6:

Pie diagram showing the percentage of study subjects who presented with breast lumps different consistencies, i.e: firm umps and hard lump with firm consistency in 55.17% of the patients and hard in 44.82%.

Table 7: Palpable Axillary Lymph node

Findings	Present	Absent	Total
No of Respondents	14	44	58
Percentage	24.13%	75.86%	100%



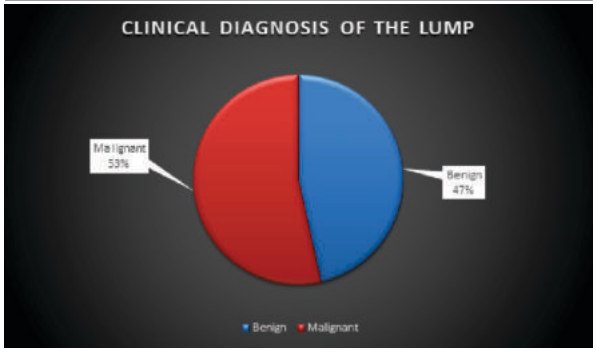
Graph 7: Palpable Axillary Lymph node

Graph 7:

Pie diagram showing the percentage of study subjects who had palpable axillary lymph nodes at presentation were palpable in 24.13% of the patients,

Table 8: Clinical Diagnosis of the lump

Clinical Diagnosis	Malignant	Benign	Total
No of Respondents	31	27	58
Percentage	53.44%	46.55%	100%



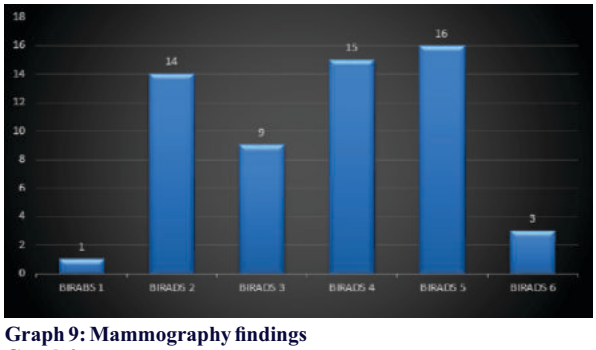
Graph 8: Clinical Diagnosis of the lump

Graph 8:

Pie diagram representing the percentage of study subjects who were diagnosed to have benign lesions and those having malignant lesions, based on clinical examination. 53.44% of patients showed malignant breast lumps and 46.55% of patients showed benign breast lumps, as diagnosed clinically.

Table 9: Mammography findings

BIRADS Grades	No of Respondents	Percentage
1	1	1.72%
2	14	24.13%
3	9	15.51%
4	15	25.86%
5	16	27.58%
6	3	5.17%
Total	58	100%



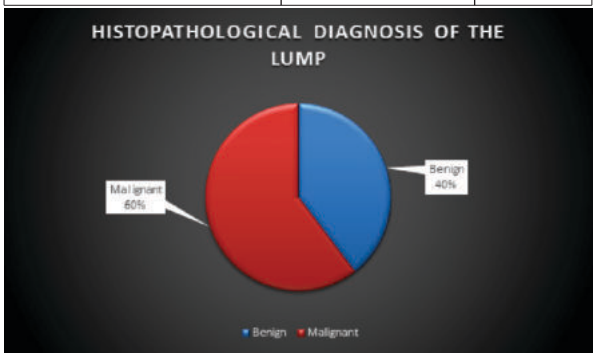
Graph 9: Mammography findings

Graph 9:

Bar diagram showing the percentage of the study subjects found to have various BIRADS grades on mammography Our study revealed that most breast lumps (27.58%) showed BIRADS Grade 5 lesions.

Table 10: Histopathological diagnosis of the lump

Histopathological Diagnosis	No. of Respondents	Percentage
Malignant	35	60.41%
Benign	23	39.65%
Total	58	100%



Graph 10: Histopathological diagnosis of the lump

Graph 10:

Pie diagram representing the percentage of subjects found to be diagnosed with benign breast lesions and those diagnosed with malignant breast lesions on histopathological examination. In the present study 60.41% of the patients were diagnosed to have malignant lesions while 39.65% of the women were diagnosed as having benign lesions, based on histopathological examination.

Table 11: Accuracy of mammography in comparison to histopathology

Mammography	Histopathology		Total
	Malignant	Benign	
Positive for malignancy	32	2	34
Negative for malignancy	3	21	24
Total	35	23	58

Sensitivity= (32/35) x100 = 91.42%
Specificity = (21/23) x100 = 91.30% Positive predictive value = (32/34) x100 = 94.11%
Negative predictive value = (21/24) x100 = 87.5%
Diagnostic accuracy = [(32+21)/58]x 100 = 91.37%

In the present study of the 35 patients who had malignant lesions on histopathology. Of these patients with biopsy proven malignancy, mammography revealed to be correctly positive (true positive) in 32 patients, but it was falsely negative in 3 women had malignant lesions. The sensitivity of mammography compared to histopathology in predicting malignant lesions was 91.42% and specificity was found to be 91.30%. The positive predictive value of Mammography was found to be 94.11%, whereas its negative predictive value was found to be 87.5%. The diagnostic accuracy of the mammography was 91.37%.

DISCUSSION

Breast cancer mortality has shown a decline since 1975[7], which may be attributable to both early diagnosis, by virtue of screening mammograms and improvements in adjuvant therapies.[8] Although various radiographic modalities are readily available to identify lesions that are suspicious for breast cancer, mammography remains vital in breast cancer screening and diagnosis.

Breast lumps have been examined using mammography since 1960. Before a woman or her doctor can feel it, a mammography will show an anomaly that could be breast cancer. As a result, mammograms are a crucial tool for the process of identifying dysplastic and neoplastic alterations. The patient feels a breast lump, which is typically painless, when breast cancer has progressed to the point that physical signs and symptoms develop. When a woman develops a new, palpable breast lump, the first imaging test she has is a diagnostic mammography.

Abnormal mammographic results are linked to the majority of breast cancers. For instance, in the Breast Cancer Detection Demonstration Project (BCDDP), more than 90% of tumors were discovered utilising mammography instead of just 10% through physical examination.[9]

This study, conducted for one and half years, from March 2020 to September 2022 was aimed to determine the diagnostic accuracy of

mammography in evaluating palpable breast lumps. A total of 58 eligible women presenting with palpable breast lump in the Department of General Surgery, MYSORE MEDICAL COLLEGE AND RESEARCH INSTITUTE, MYSURU were studied.In the present study most of the women presented with age between 46 to 60 years. Women with age 60 or above constituted 12.06% while, 41.37% were aged between 31 to 45 years, depicting the high prevalence in fifth and seventh decade of life. This in accordance with the study by Chopra et al, where they observed the peak in the disease occurrence in ages 40-60 years, with a peak proportion between ages 45- 49 years.[10]

Nipple discharge was seen in 12.06% of the cases with palpable lumps. The shape of the lesion was found to be globular in 37.93%, retracted nipples were found in 15.51% of the patients and the consistency of the breast lump was hard in 44.82% of the patients. The axillary lymph node was present in 24.13% of the women and these features led us to make a clinical diagnosis of malignancy in about 53.44% of patients.

In our study, mammography findings revealed, BIRADS grade 4 and above breast lesions in 58.61% of the patients. For a positive confirmation, the standard histopathological/cytological testing was done and reports suggested 60.14% of the patients, diagnosed to have malignant lesions while 39.65% of the women were presented with benign histology changes in the lesions.

On correlation of the mammography to histopathological findings, of the 35 malignant patients diagnosed via histopathology, 32 had malignant lesions found on mammography and 3 women had benign lesions. Therefore, reflecting a statistically significant sensitivity of mammography compared to histopathology, in predicting malignant lesions at about 91.42% with a credible specificity of 91.30%. Hence, the diagnostic accuracy of the mammography was 91.37%. In other words, the probability of having a positive mammography in a patient with breast cancer is found to be 91.42%, indicative of the good sensitivity of the test. Whereas, the probability that themammography will be negative when the lesion is benign is about 91.30%, which indicates the high specificity of mammography. The probability that a patient who is found to have a BIRADS grade 4 and above lesion on mammography, actually has a malignant breast lump is 94.11%. This suggests that the positive predictive value of mammography is reasonably high whereas the probability of a patient who is found to have a BIRADS Grade 3 and below lesion on mammography to have a lesion that is benign on histopathology is about 87.5% suggesting that a high negative predictive value for mammography can be observed.

However, the diagnostic acumen of an observer dictates the net accuracy and predictive capacity of the mammography, in addition to the other limitations that interfere with the accuracy of mammography such the age of the patient, the density of the breast, the size of the lump with respect to the size of the breast and past surgical and radiation status of the breast.

Among the various imaging modalities for the breast cancer, mammography based screening procedures are most suited in early diagnosis and facilitating early intervention.[11] It has been reported that the sensitivity of mammography to detect breast cancer ranges from 63% to 98%, but has been reported to be as low as 30%– 48% in dense breasts.

Several groups have evaluated the preoperative use of supplemental magnetic resonance (MR) imaging, ultrasonography, or both after mammography and clinical breast examination to assess the extent of disease within the breast(s). It has thus been found that mammography provides reasonably accurate and useful information for the diagnosis and treatment planning of breast lumps.[12]Even while tumors as tiny as 0.5 cm may be detected by mammograms, 10 to 20 percent of malignancies are not visible by mammography, even when they are much larger. The main goal of a mammography in a patient with a solid, dominant mass (suspicious mass) is to check the opposite breast and the normal breast tissue around it for non-palpable malignancies, not merely to help with the diagnosis of the palpable lump.

A negative mammogram is not a guarantee that there is no cancer, despite the fact that mammography has been determined to have a good sensitivity and specificity. This is because mammography has a number of limitations that reduce its accuracy. As a result, a mass that does not vanish or collapse with aspiration needs to be suspected of being cancerous and biopsied.[13]

CONCLUSION

In this study, 58 patients, with clinically palpable breast lump, were assessed to compare the accuracy of mammogram with that of histopathology.

Due to its comparatively strong positive and negative predictive values, mammography has been shown to be a useful diagnostic tool for identifying breast lesions. Mammography is advised to be a crucial component of the diagnostic process for breast lumps in individuals with palpable breast lumps since it can be a helpful adjuvant to rule out breast cancers. Wherever possible, combining mammography with a clinical examination can lead to a more accurate and sensitive breast lump diagnosis. Image guiding with an ultrasound may increase diagnostic accuracy even when there is a palpable breast lump, particularly when a mammography unintentionally uncovers a smaller lump.

After coming to this conclusion, it is important to remember that the algorithms for clinical and imaging examination of palpable breast lumps are stratified by the woman's age. Young women with breast lumps and dense breasts may have limited use for mammography, and even in cases where the test is negative, a biopsy is still recommended. However, even if the mass is clinically questionable for cancer, bilateral diagnostic mammography should be done on an older woman if a palpable breast lump is noticed. In this situation, a mammography not only helps with the diagnosis but also enables us to spot any additional worrisome lesions or calcifications in either breast that might have an impact on the course of treatment. Mammography generated results for the early detection of cancer that were fairly accurate. Therefore, after a clinical diagnosis of the symptoms, the accuracy of mammography should be acknowledged and considered.However, the sensitivity of mammography, when compared to histopathology in predicting malignant lesions was found close to 91.42% and specificity of 91.30% was found.

Regardless of the imaging results, clinically worrisome masses should be biopsied due to the discovery that a small number of mammographic harmless-appearing lesions may actually be cancerous.

Based on our findings, we recommend the use of mammography following clinical detection of a breast lump, with or without further radiological aid, to come to a reasonably certain diagnosis. Even though the accuracy and the application of mammography may be limited by various factors such as the experience of the observer, the size of the lump, the lump:breast ratio, the breast density and the hazards of radiation exposure, it continues to be an invaluable tool for evaluation of breast lumps and hence must be performed in all patients who present with clinically palpable breast lumps, as a first line of radiological investigation. The mammography results should be further supplemented with histo-pathological confirmation, to reach the final diagnosis.

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