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Original Research Article

Comparison between Digital Mammography and MR Mammography for Evaluation of Probably Benign Breast Lesions in Women Aged 35 to 50 Years with FNAC Correlation

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Abstract: Breast cancer is the second most common cancer in Indian women. According to the national cancer registry project report about 52000 females develop breast cancer in India per year. It is reported by ICMR that one in 22 women in India is likely to suffer from breast cancer during her lifetime, while the figure is more in America with one in eight being a victim of this cancer. An early accurate diagnosis of breast cancer has a favorable prognosis than that of late detection. But more than 90% of the diagnosed cases are in the stage II, III and IV. In most of the cases, the suspicious breast lesions turn out to be benign. All the patients in the age group of 35 to 50yrs, who had come to the radiology department for screening mammogram and patients who are having high risk factors for malignancy were taken into the study. A total of fifty patients with probable benign breast lesions on digital mammogram and also having high risk factors for malignancy were further evaluated by MRI. Ultrasonography was done in all patients followed by USG guided FNAC. Aim of this study is to prospectively establish the efficacy of MRI in characterization of probably benign breast lesions in young patients. The Objectives of this study are **c**omparison of Contrast MR Mammography and digital mammography in evaluating probably benign breast lesions (BIRADS III) in women more than 35 years of age and to study the efficacy of Contrast MR Mammography in breast lesions characterization in probably benign lesions with histopathology as gold standard. After the Mammogram was studied, 50 patients with probable benign breast lesions were selected for further evaluation. Ultrasonography was done in all patients as an adjunct to Digital Mammography. All the patients underwent MRI mammogram followed by ultrasound guided FNAC of the lesions. The pathology reports were collected. Results were analyzed. Our study shows MR mammogram is 14% more sensitive to Digital mammography in detecting breast lesion. Contrast MR is more sensitive in detecting the malignant breast lesions.

Keywords: Digital Mammogram, BIRADS III Lesions, Magnetic resonance Mammogram, Ultrasound Mammogram, Malignant Breast Lesions.

INTRODUCTION

Female breast cancer is a complex multifactorial disease, the etiology of which involves a strong interplay between environmental and genetic factors. Although high penetrance cancer genes, BRCA1 and BRCA2, have been identified, these account for only 5–10% of cases [3, 4]. The others high risk groups are (i) Family history of breast cancer. (ii) Previous personal history of breast cancer and other breast diseases such as fibrocystic disease. (iii) Excessive exposure to ionizing radiation (iv) History of cancer of the endometrium, ovary or colon [5-7]. Early menarche, late menopause, nulliparity, elderly primi, diminished lactation are also generally associated with breast cancer. An early accurate diagnosis of breast cancer has a favorable prognosis than that of late detection. But more than 90% of the diagnosed cases are in the stage II, III and IV [8]. In most of the cases, the suspicious breast lesions turn out to be benign [9, 10].

The present challenge for the clinicians and the radiologists remain to distinguish between the probable benign lesions from the probable malignant lesions. Most of these women are referred for multiple diagnostic tests which can include mammography, galactography, ultrasound, colour doppler ultrasound, fine needle aspiration, and in some cases open surgical biopsy [11, 12].

Mammography is the most commonly used imaging method and is the only currently known means of proven effectiveness especially in patients with non palpable carcinoma [15, 16]. For patients younger than 50 years of age there is more often a delay in the diagnosis of breast cancer than for older women [18].

Digital mammography uses an electronic system to record an image of the breast that can be stored on a computer instead of on hardcopy films. Image-processing algorithms allow manipulation of fine differences in image contrast. As a result, subtle differences, even in dense tissue, can be appreciated [19]. A number of digital mammography technologies are under evaluation. Potential advantages include improvements in image contrast, post facto manipulation of the image (avoiding the need for repeat exposures due to technical problems), elimination of the problem of lost films, reduction in film library maintenance costs and the ability to transmit the images over long distances (telemammography). Early experience has shown that digital mammography reduces the number of patients recalled for additional views, reduces the number of false-positive breast biopsy results and can potentially enable detection of breast cancer at an earlier stage [20, 21]. Lewin et al. [30] prospectively compared full-field digital mammography (FFDM) with screen-film mammography (SFM) for cancer detection in 4945 women aged 40 years or older. Although the difference in cancer detection was not significant, FFDM had a significantly lower recall rate than SFM. Similar results were reported in another series of 6736 examinations by the same author Fisher *et al*. in their study found [20], digital mammography had equivalent diagnostic accuracy compared with SFM, and higher sensitivity and reliability in characterization of micro calcifications [21]. Challenges and potential problems for digital mammography include: a need to prove equivalence in detection and diagnosis with conventional mammography; the high cost of digital mammography equipment; and cumbersome workstation technology.

Magnetic resonance imaging (MRI) is a new breast imaging technique that is gaining popularity [29, 30]. MRI seems to be ideally useful for breast imaging due to its ability to depict excellent soft tissue contrast. With the use of gadolinium-DTPA as an intravenous contrast agent, breast MRI has been shown to be capable of detecting early breast cancer [31] with 94% to 100% sensitivity.[32-34] The enhancement of the breast lesion reflects local tissue changes in blood flow, capillary permeability, and extracellular volume[33,34]. These changes are thought to be characteristic of tumor-related angiogenesis and help to distinguish tumors from surrounding stromal and fatty tissues. MRI quality is not influenced by breast density, which is believed to limit the effectiveness of mammography in young women.

The sensitivity of MRI appears to be higher than mammography in characterizing probable benign breast lesions [35, 36]. Plain (non-contrast enhanced) MRI may show fibrous tissue, fibro adenomas and cysts but its diagnostic accuracy may be less. To the contrary contrast enhanced MRI and dynamic MRI have been found to be more accurate in detection of malignancy within dense breast tissue, differentiation of malignancy versus scarring and also in detection of malignancy in patients with breast implants. The use of MRI as a screening method for the general population is not practical at present because of its high cost and inadequate specificity [37]; however, it may be an appropriate screening tool for high-risk populations.

EXPERIMENTAL SECTION/ METHOD AND MATERIAL

All the patients in the age group of 35 to 50yrs, who had come to the radiology department for screening mammogram and patients who are having high risk factors for malignancy were taken into the study. A total of fifty patients with probable benign breast lesions on digital mammogram and also having high risk factors for malignancy were further evaluated by MRI. Ultrasonography was done in all patients followed by USG guided FNAC.

The patients with high risk for malignancy included, a) Patients with family history of breast cancer, Previous personal history of breast cancer and diseases like fibrocystic disease, History of excessive exposure to ionizing radiation, History of cancer endometrium, ovary or colon. A woman with a past history of unilateral breast cancer who satisfied the criteria was also eligible if her contra lateral breast had not been removed.

Pregnant or lactating women, moribund patients are not included in this study. Women with pacemaker and history of claustrophobia were excluded.

A clinical history and physical examination were done for all patients included in the study. Routine Screening Mammography was done. After the Mammogram was studied, 50 patients with probable benign breast lesions and having high risk factors were selected for further evaluation. Ultrasonography was done in all patients as an adjunct to Digital Mammography. All the patients underwent MRI mammogram followed by ultrasound guided FNAC of the lesions. The pathology reports were collected. Results were analyzed.

The mammography was done on Novation DR Siemens machine. Conventional Cranio caudal (CC) and Medio lateral oblique (MLO) view of both breasts were taken. Further views were done when necessary. These mammogram images were reviewed. By using the American College of Radiology Breast Imaging Reporting and Data System (BI-RADS) category, these patients were divided according to the findings into five groups. BIRADS: 1, negative; 2, benign finding; 3, probably benign lesions 4, suspicious abnormality and 5, highly suggestive of malignancy [19].

The specific type of BIRADS III lesions are, clustered round calcifications, a noncalcified circumscribed solid mass lesions, a focal symmetry, multiple cluster of tiny calcifications, scattered tiny calcifications, and multiple solid circumscribed mass lesions.

The mammographic density of the breast tissue was also evaluated from the screening mammogram. According to ACR, the breast density is grouped into four types. Type I – Mostly fatty, Type II- Fibro glandular, Type III- Heterogeneously dense Type IV- Dense. USG was done on Logic P5 machine. Differentiation of solid and cystic lesions was done.

MRI mammography was done using Siemens Magnetom 1 Tesla machine with dedicated breast coils. The coil support apparatus was designed to provide breast immobilization with gentle medial-lateral compression, thereby optimizing coil coupling to each breast. Following sequences were taken for all patients: T1 Weighted and T2 Weighted axial, coronal and sagittal and STIR sagittal , T2 Fat Saturated coronal and 3 D Flash pre and post contrast sequences. Gadolinium-DTPA was given at a dose of 0.1mmol/kg and the uptake of contrast by the lesions was assessed. The precontrast images were subtracted from the contrast-enhanced images to improve visualization of the enhancing structures.

In cases where a potentially suspicious area of enhancement (anything other than an obvious benign structure such as a blood vessel or scar) was detected, time intensity curve of these lesions were obtained and analyzed. These images were used to further track tracer kinetics and to help characterize the lesion for clinical management.

MRI results were analyzed in a pattern similar to the BI-RADS classification using a combination of morphology and enhancement kinetics [22]. The various criteria that were considered to evaluation of lesions on MRI were: Number of lesions, Architectural Distortion, Overall lesion configuration, lesion margins, internal architecture (eg, internal septations or central clearing), and the time course of signal intensity changes. There are 3 types of time intensity curves are seen Type I – Enhancement continues through the duration of study, In type II, there is a plateau, where as in type III, signal intensity diminishes (Washout).

Out of fifty patients MRI detected total 61 lesions. Out of these lesions five lesions were suspicious for malignancy. On time intensity curve it shows type III curve. Rest of the lesions show characteristics of benign lesion with Type I or Type II curve. Ultrasound were used to do FNAC of some of the small lesions and also used to characterize some of the lesions.

All patients were underwent FNAC of the lesion .Informed written consent was obtained. PT, aPTT , HBV and HIV tests for all patients were done. Under aseptic precaution USG guided FNAC of the lesions were done. The specimen slides were sent to the Pathology department of Command Hospital and the reports were collected.

RESULTS AND DISCUSSION

Out of fifty patients who participated in the study, Digital mammography detected 54 lesions and MRI mammography detected 61 lesions.

AGE DISTRIBUTION

Out of 50 patients , age distribution of these patients are given below.

Table-1: Age distribution of the study population

S.No	Age Groups (yrs)	No. of cases	Percentage
1.	35 to 40 yrs	13	26%
2.	40 to 45 yrs	18	36%
3.	45 to 50 yrs	19	38%
	Total	50	100

In our population, the most common age groups are 45 to 50 yrs. Other age groups also form a significant percentage of this study.

RISK FACTORS

In our study out of 50 patients 10 (20%) were having history of hormonal replacement therapy and 17 (34%) patients were clinically suspected of having fibrocystic diseases. 02 Women (4%) gave family history of breast cancer. 02 Women (4%) gave personal history of breast cancer. Among the family history both had first degree relations with breast cancer. Out of 50 women 9 (18%) did not have any associated risk factors. Patients with H/O of early menarche and late menopause constitute 20 % of the study population. In our study most common risk factor was HRT and significant percentage were without risk factors.

Table-2: Risk Factors

S No	Risk Factors	No Of Patients	Percentage
1.	HRT	10	20%
2.	Benign Breast Disease	17	34%
3.	Family H/O Breastcancer	2	4%
4.	Previous H/O of Breast Cancer	2	4%
5.	Early Menarche	7	14%
6.	Late Menopause	3	6
7.	No Risk Factors	9	18

ANALYSIS OF FINDINGS ON DIGITAL MAMMOGRAPHY:

Sites of the Breast lesions on Digital Mammography:

In our study most of the lesions are in Supero lateral quadrant. (Left Breast> Right breast). 19 (36 %) lesions are in Supero lateral quadrant. In our study least common quadrant is Superomedial quadrant comprising 9 (17%) lesions.

Table-3: Sites of the Breast lesions on Digital Mammography

Quadrants	Number of lesions	Percentage of the lesions
SLQ	19	36%
ILQ	11	20%
SMQ	9	17%
SLQ	15	27%
Total number of lesions	54	100%

Breast parenchymal density pattern:

Out of 50 patients 14 (28%) had Type I pattern. 22 (44%) patients had Type II pattern. 11 (22%) had Type III pattern. Type IV pattern seen in 3(6%) patients. The breast density was divided according to the ACR criteria. This criteria is fully explained in the introduction section.

Table-4: Breast parenchymal density pattern

Type of breast parenchymal pattern	Number of patients	Percentage.
Type I	14	28%
Type II	22	44%
Type III	11	22%
Type IV	3	6%
Total	50	100%

In our study commonest pattern was Type II and next common was Type1 and least common was Type IV pattern.

Density of breast lesions on Digital mammography

In this study, twelve lesions show high density while compared with surrounding breast parenchyma density. Thirty one lesions show iso to slightly high density. 11 lesions show low to iso density relative to breast parenchyma.

Table-5: Density of breast lesions on Digital mammography

Density of the lesions	Number of lesions	Percentage of lesions
High density lesions	12	22.2 %
Iso to slightly high density lesions	31	57.4 %
Low to Iso density lesions	11	27.4 %
Total	50	100%

Margins of the lesions on Digital mammography:

In this study, lesions were analyzed on the basis of margin in digital mammography. 23 lesions show sharp well defined margin. 18 lesions show lobulated margins and remaining 13 lesions show indistinct margins.

Table-6: Margins of the lesions on Digital mammography

Margin of the lesions	Number of lesions	Percentage of the lesions
Lesions with sharp margin	23	42.5%
Lesions with Lobulated margin	18	33.3%
Lesions with Indistinct margin	13	24.2%
Total number of lesions	54	100.0%

Lesions with or without calcification on Digital Mammography:

In our study, out of 54 lesions 19 show calcification within. 11 lesions show clustered round calcification and 8 lesions show scattered calcification. Rest of 35 lesions shows no evidence of calcification. Significant percentage of lesions showed calcification in our study.

Table-7: Lesions with or without calcification on Digital Mammography

S. NO	Nature of Lesions	Number of lesions	Percentage
1.	Lesions without calcification	35	64.8%
2.	Lesions with calcification	19	35.2%
3.	Total number of lesions	54	100.0%

Morphology of Probable benign lesion on Digital mammography

Out of 54 lesions 11- lesions presented as non calcified solitary mass lesions, 17 lesions presented as asymmetrical breast density, 11 lesions presented with round smooth clustered micro calcification within. 2 Patients present with multiple mass lesions. In our most study common lesions are lesions with asymmetrical breast density.

Table-8: Morphology of Probable benign lesion on Digital mammography

Lesions	Number of lesions	Percentage
1. Non calcified circumscribed solitary mass lesions	11	20.3%
2. Lesions with scattered calcification	08	14.8%
3. Multiple mass lesions	2	2.7%
4. Lesions with asymmetrical breast density	17	31.5%
5. Lesions with multiple tiny clusters of calcification	11	20.3%

ANALYSIS OF FINDINGS ON MR MAMMOGRAPHY

The total number of lesions detected in MR mammography in all 50 patients was 61. MRI detected 7 more lesions than the digital mammography. These lesions are analyzed on the basis of margin of the lesions, shape, area of necrosis, lymph node involvement, and enhancement pattern and time intensity curve.

Sites of the Breast lesions on MR Mammography

In our study most of the lesions are in Supero lateral quadrant. (Left Breast> Right breast). 22 (36 %) lesions are in Supero lateral quadrant .SLQ was the most common site for lesions. In our study least common quadrant is Superomedial quadrant comprising 9 (17%) lesions.

Table-9: Sites of the Breast lesions on MR Mammography

Quadrants	**Number of lesions**	**Percentage of the lesions**
SLQ	22	36%
ILQ	13	21.3%
SMQ	11	18.2%
SLQ	15	24.5%
Total number of lesions	61	100%

Margin of the lesions on MR Mammography

Out of 61 lesions, 25 lesions show well circumscribed margin, 19 lesions show lobulated margin and 17 lesions show irregular margins.

Table-10: Margin of the lesions on MR Mammography

Margin of the lesions	Number of lesions	Percentage of the lesions
Sharp and well circumscribed lesions	25	40.8%
Lobulated margin	19	31.0%
Irregular margin	17	27.8%
Total number of lesions	61	100.0%

Lesions with necrosis on MR Mammography

Out of 61 lesions, 16 lesions show areas of necrosis within. Rest of 45 lesions shows no necrosis.

Table-11: Lesions with necrosis on MR Mammography

	Number of lesions	Percentage
Lesions with necrosis	16	26.2%
Lesions with out necrosis	45	73.8%

Lesions with enlarged axillary lymph nodes on MR Mammography

Out of 61 lesions, 2 lesions show ipsilateral enlarged axillary lymphadenopathy.

Table-12: Lesions with enlarged axillary lymph nodes on MR Mammography

	Number of lesions	Percentage
Lesions with enlarged axillary lymph nodes	2	3.3%
Lesions without enlarged axillary lymph nodes	59	96.7%

Enhancement pattern

Out of sixty one lesions 07 show very intense enhancement pattern. 19 lesions show moderate to intense enhancement pattern. 24 lesions show mild to moderate enhancement pattern. 11 lesions show no enhancement. In our study, commonest type of enhancement was mild to moderate enhancement. Least common is very intense enhancement pattern.

Table-13: Enhancement pattern

Enhancemetnt pattern	Number of lesions	Percentage
Very intense enhancement	7	11.5%
Moderate to Intense enhancement	19	31.2%
Mild to moderate enhancement	24	39.3%
No enhancement	11	18.0%
Total	61	100%

Architectural distortion on MR Mammography

In this study, out of 61 lesions, 09 lesions show architectural distortion and 52 lesions show no architectural distortion.

Table-14: Architectural distortion on MR Mammography

	Number of lesions	Percentage
Lesions with architectural distortion	9	14.7%
Lesions without architectural distortion	52	85.3%

Time intensity curve on contrast enhanced MR Mammography

During analysis of time intensity curve, five lesions show Type III curve which means rapid uptake and early washout. Rest of the lesions show Type I or Type II curve. Most of the lesions show type I curve.

Table-15: Time intensity curve on contrast enhanced MR Mammography

Type of Time intensity curve	Number	Percentage
Type I	28	45.6%
Type II	19	31.9%
Type III	05	8.1%

AGE GROUPS	No of lesions in Mammography	No of lesions in MRI
1. 35 to 40 yrs	14	16
2. 40 to 45 yrs	19	23
3. 45 to 50 yrs	21	22

On MRI, based on time intensity curve five patients with probable benign lesions (having Type III intensity curve) on mammography were suggested to be malignant.

Pathologic Analysis

In our study total 61 lesions were analyzed. Out of sixty one, 5 malignant lesions were detected in Fine needle aspiration cytology report. 4 were invasive ductal carcinoma; one was Intra ductal carcinoma in situ. Rest of the lesions were non malignant.

CASE NO. 1

A 43-year-old woman with history of mass lesion right breast with positive family history of breast cancer

DIGITAL MAMMOGRAPHY

CASE NO. 1

A Mammogram of 47-year-old woman with history of bloody discharge from the nipple

Mammography

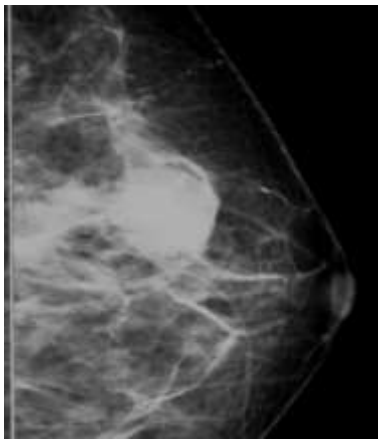

Fig-1: Digital mammography shows small hyper dense mass lesion with smooth margin

MRI BREAST

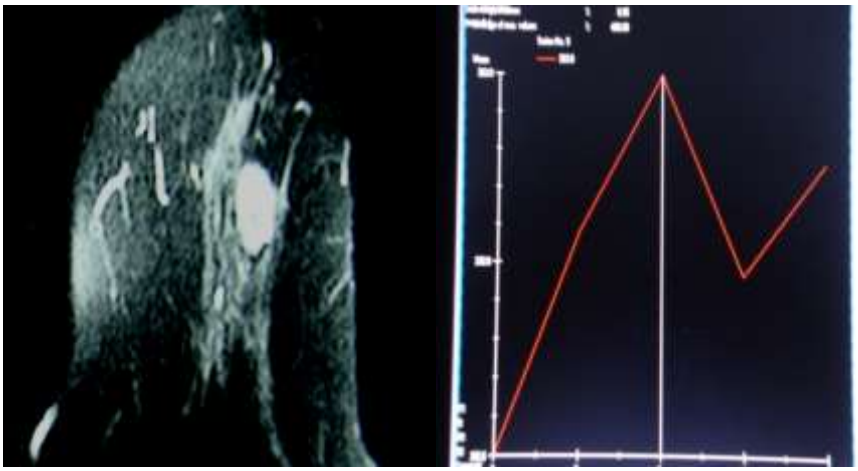

Fig-2: Post contrast enhanced Axial section shows intensely enhancing small mass lesion with smooth margin. Time intensity curve shows type III curve.

CASE NO 2

A 46 year-old woman with history of mass lesion left breast with previous history of benign breast disease.

DIGITAL MAMMOGRAPHY

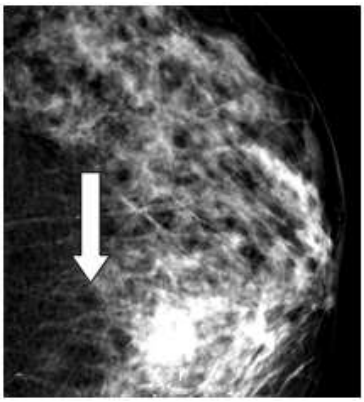

Fig-3: Digital mammography shows small hyper dense mass lesion with irregular margin Few calcified foci noted in the periphery of the lesion.

MRI BREAST

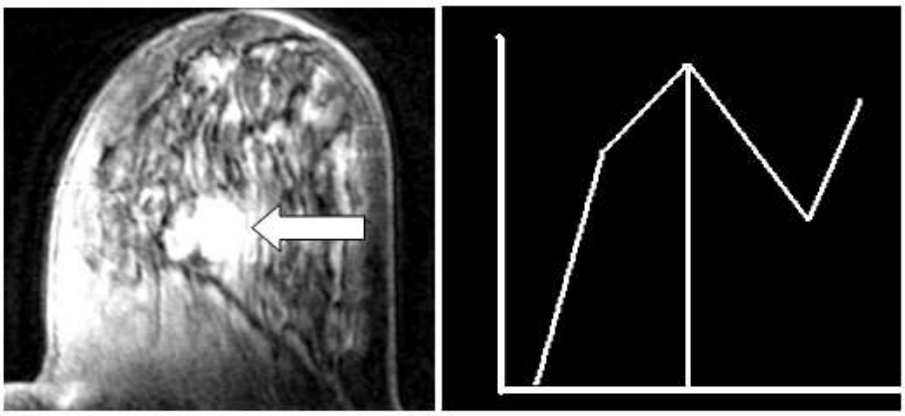

Fig-4: Post contrast Axial MR section show intensely enhancing small mass lesion well defined margin. Medially it show irregular margin. Time intensity curve show Type III Curve.

CASE NO 3

A routine screening mammogram of 37 year female with out any risk factors.

DIGITAL MAMMOGRAPHY

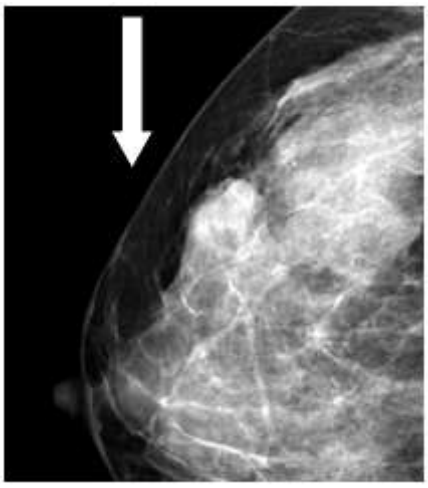

Fig-5: Digital mammography show small iso to hyper dense mass lesion with smooth margin. Inferior border of the lesion is not well delineated.

MRI BREAST

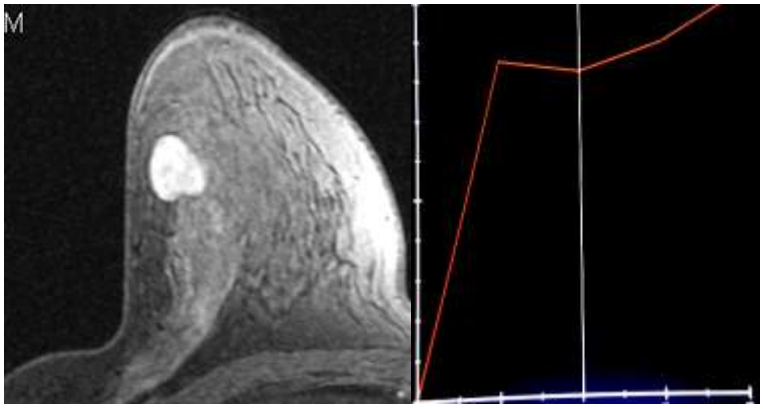

Fig-6: Post contrast T1 W axial section show well circumscribed mass lesion with intense enhancement at Supero lateral quadrant .Time intensity curve show Type I curve.

CASE NO. 4

A 38 year old female with history of pain in both breast and mass lesion in left breast.

DIGITAL MAMMOGRAPHY

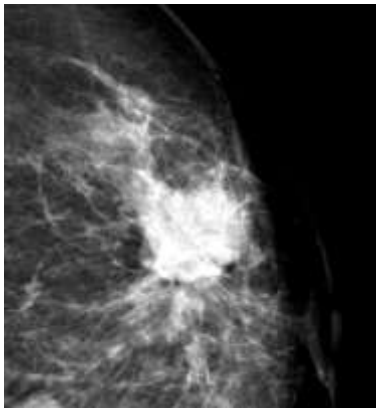

Fig-7: Digital mammography show small high density mass lesion with irregular margin.

MRI BREAST

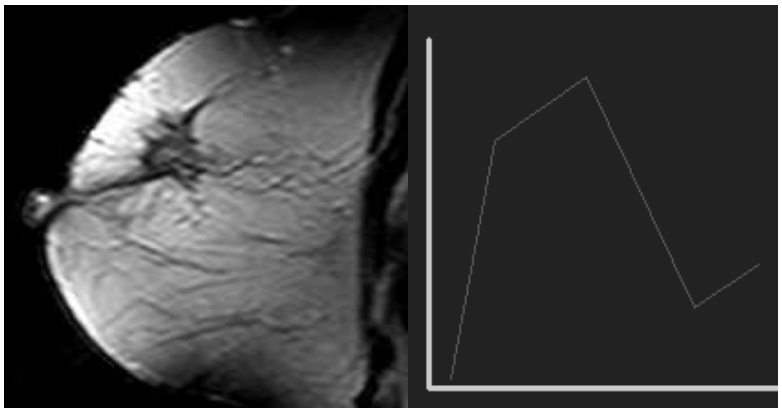

Fig-8: T1 W Sagittal section show hypointense mass lesion with speculated margin in the super lateral quadrant. Time intensity curve show Type III Curve.

DISCUSSION

The objective of our study was to compare breast MRI with Digital mammography, in women with probable benign breast lesions. Our second objective was characterization of these lesions by MR mammography.

The patients who had come to the Dept. of Radio diagnosis for routine screening mammography or with history of risk factors from the period of Feb 2009 to July 2010 were included in this study. In the Digital Mammography examination, we found out 54 probable

benign lesions out of 50 patients. These patients were further subjected to MRI study, in which we had found out total 61 lesions.

All 50 patients were subjected to histopathological examination. Total of 5 patients showed evidence of malignancy. Retrospectively out of these 5 cases of malignancy, 4 cases were suspected for malignancy on MRI but one case was diagnosed as benign lesion. The fifth case suspected for malignancy on MRI, turned out to be benign on histopathology. The false positive rate in our study is 20% (One case). The false negative rate in our study is 20% (one case)

In our study, Patients were included between the ages of 35 yrs to 50 years. The mean age of our study was 42.5 years and the commonest age group of patients was 40 to 45 years. In Mieke Kriege [43]et al, among total of 1909 patients, range of age was 25 to 70 yrs and mean age group was 40 yrs. In Warner et al [44] study group, mean age group was 43 yrs; Range of age group was 26 to 59 yr. In Kuhl et al, the mean age group was 41.7 yrs. Range of age was 27 to 59 yrs. In Katja C. Siegmann et al [55], mean age was 49.4 yrs and range of age was 25 to 76 yrs. Mean age of our study was in consensus with the findings of various authors as mentioned above.

S.No.	Study	Year	Mean age	Range of age
1.	Mieke Kriege et al [43]	1999 to 2003	40 yrs	25 to 70 yrs
2.	Katja C. Siegmann et al [55]	1994	49.4	25 to 76 yrs
3.	Kuhl et al [38]		41.7yrs	27 to 59 yrs
4.	Warner et al [44]		43yrs	26 to 59 yrs
5.	Our study		42.5	35 to 50 yrs

In our study, out of 50 patients we have detected 54 probable benign lesions on digital mammography. Among 54 probable benign lesions, eleven (20.3%) lesions presented as solitary mass. The most common morphology of probable benign lesions in our study was lesion with asymmetric breast density (35%). In Varas et al, which studied 544 probable benign lesions, the commonest form of lesions were solitary mass constituted 40 % (204 lesions), second commonest were asymmetric breast density constituting 26 % lesions (134 lesions). Percentages of probable lesions were more or less consensus with our study.

In our study, the malignant lesions which are detected by MRI and later confirmed by histopathological examination, showed irregular margin, heterogeneous intense enhancement on post contrast sequences and Type III time intensity curve . On Mammography among these lesions two lesions showed high density pattern and other two lesions showed iso to low density as compared with surrounding breast parenchyma. Two lesions showed clustered calcification within. All four lesions showed architectural distortion in both imaging modalities.

In our study, Out of seventeen lesions which showed irregular margin in MRI, four turned to be positive for malignancy, constituting 23.3%. In our study, all 5 lesions suspicious for malignancy showed heterogeneous enhancement, out of which four turned out to be malignant. 80 percents lesion with heterogeneous and intense enhancement and Type III time intensity curve will be malignant according to our study.

Katja C. Siegmann et al [55], in their study observed that late heterogeneous lesion enhancement correlated significantly with malignancy. This correlation was explained by the washout phenomenon of malignant lesions, which shows an irregular enhancement pattern within the lesion that subsequently becomes heterogeneous. They also stated that other lesion characteristics are not as helpful in distinguishing malignant from benign disease in MR imaging—detectable lesions. They further stated, for a better understanding of the high positive predictive value of well-defined margins, one has to consider MR image resolution.

Stomper *et al*. also [60] stated that the analysis of margins of focal enhancing areas is of less value than analysis of margins in mammograms because MR images do not have as high a resolution as film-screen mammograms. The shape of small lesions is difficult to judge for the same reason. All four malignant lesions in our study measures less than 30 mm. Our study is in consensus with Katja C Siegmann *et al*. and Stomper *et al*.

In our study, all 5 lesions suspicious for malignancy showed Type III time intensity curve pattern. 80 percents lesion with Type III time intensity curve will be malignant according to our study.

Kaiser and Zeitler [56] and Gribbestad *et al.* [57] reported that all carcinomas could be differentiated from benign lesions by early signal enhancement in a series of 25 and 18 dynamic contrast-enhanced breast MR examinations, respectively. Kaiser and Zeitler [56] reported that carcinomas showed a rapid increase in signal intensity within the first two minutes after administration of gadopentetate dimeglumine and a much slower increase thereafter. All six malignant tumors found in these 25 patients showed enhancement characterized by a sudden increase in signal intensity on the order of 100% . Sixteen benign lesions showed a

substantially different pattern of enhancement. This showed a much slower increase in signal intensity that did not plateau for several minutes. Stack et al [58] reported similar findings in a study of gadolinium enhanced dynamic examinations of nine malignant and nine benign lesions. Our study is in consensus with study of Kaiser and Zeitler *et al*. and Stack *et al*.

In our study, only two lesions (40%) out of five malignant lesions presented with enlarged with lymph node. In Mieke Kriege *et al*. [43], which compared the efficacy of MRI with that of mammography in high risk women. They screened 1909 eligible women for a period of follow up of 2.9 yrs. It detected 51 cancers. The combined incidence of positive axillary nodes and micro metastases in invasive cancers in their study was 21.4 percent. In our study rate of positive lymph nodes is higher than Mieke Kriege study, likely because of less number of cases we have studied.

In our study, Digital mammography detected 19 lesions with calcification within. On MRI calcification was not detected in any of the patients. It showed inherent negativity on detecting calcified lesion on MRI. Breast density is not a factor in diagnosing the lesions on MRI. On Digital Mammography, breast density is important factor and may reduce the diagnostic accuracy of the study.

In our study the cancer detection rate was 7.5 %. In Varas *et al*. [50] which followed up 511 BIRADS III lesions for a period of two year. Out of 504 lesions they have detected two cancer lesions. The cancer detection rate was 0.4 % .It is much less than our study. Our study showed higher cancer detection rate. It may be because of study was being conducted in a tertiary centre or different composition of population

In our study, we have detected 61 lesion in MR mammography and 54 lesions in Digital mammography. MR mammography detected extra 7 lesions than digital mammography. It shows the sensitivity of MR Mammography is more than Digital mammography in detecting breast lesions. In our study, the MRI showed 14% more sensitivity than Digital mammography in detecting total number of lesions.

Our study showed sensitive of MR mammography in detecting malignant lesion was 80 %. Specificity of MR mammography is 92.3 %. In Mieke Kriege *et al*. [43] this compared the efficacy of MRI with that of mammography in high risk women. It screened 1909 eligible women for a period of follow up of 2.9 yrs. It detected 51 cancers. The sensitivity of MRI in this study was 79.5% and specificity was 89.8%. Our study is consensus with Mieke Giekre [43] study in term of sensitivity and specificity.

Our estimates of sensitivity of the screening modalities were based on only five tumors that were detected during the study. In our study, the results showed four lesions were correctly diagnosed as malignant on MRI. One lesion was missed and one patient was wrongly diagnosed as malignant on MRI. All lesions were diagnosed as probable benign lesion on Digital mammography. It is concluded in our study, MRI showed 80 % sensitivity for detecting malignancy and 20 % false positive, 20 % false negative. Specificity for MRI in our study is 90%. As a result, our estimate of 80 % sensitivity for MRI is relatively equal to other study.

Our results indicate that the sensitivity of breast imaging can be increased by complementary use of MRI. For patients in whom the status of breast lesion remains unclear, MRI, though costliest among all other complementary diagnostic modalities, may help to reduce the number of unnecessary biopsies and diagnostic ambiguities. Our results suggest that MRI may be superior to mammography, ultrasound, and physical examination of the breasts for the surveillance of women from age group 35 to 50 yrs.

All patients with age between the ages of 35 to 50 years who had come to Dept of Radio diagnosis for routine screening were evaluated by Digital mammography, MRI and USG guided FNAC. Total numbers of 54 probable benign breast lesions were detected on Digital mammography from 50 patients. Total numbers of 61 probable benign breast lesions were detected on MR mammography from 50 patients. The MR is 14% more sensitive to Digital mammography in detecting breast lesions. Total numbers of 5 malignant lesions were detected by USG guided FNAC and histopathology from 50 patients. Out of 5 suspicious malignant lesions detected on MRI, four lesions were confirmed to be malignant on histopathology and one lesion turned out to be a benign lesion. One lesion was diagnosed as benign by MRI, was later confirmed to be a malignant lesion by Histopathology. In our study the True positive rate for MRI is 80 %, False positive rate is 20% and False negative rate is 20 % which is comparable to other studies. The correlation of positive predictive value for MR mammography was found to be statistically highly significant (p value < 0.005)

CONCLUSION

The MR mammography is more sensitive than digital mammography in detecting breast lesions. It is also shows to be highly sensitive in detecting breast lesions in young women and women with dense breast tissue. In case of dilemma in characterizing the breast lesions by Digital mammography, irrespective of its high cost, MR mammography may be useful for better delineation of the lesions.

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