



## ASSESSING REQUIREMENT ON ADDITIONAL SCREENING FOR DETECTION OF BREAST CANCER BY MRI AFTER SCREENING WITH ULTRASOUND

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### ABSTRACT

In case of patients with dense breast it is generally difficult to detect the criticality of cancer like invasive lobular cancer by performing mammography, though it was the basic method involved in screening breast cancer. Thus, here took indulgence of MRI in exploring alternative screening techniques for breast cancer. This MRI can be taken as an add-on diagnostic tool for physical examination, ultrasound and mammography. But, the wide use of MRI screening is limited due to its cost and variable specificities in population. A total of 872 patients have been enrolled into the study who were suspected to have breast cancer on physical examination and further underwent ultrasonography. Among these, 193 patients who have been reported with lesions have been included in the study to perform MRI in further. Study was carried out in RVS Institute of Medical Sciences, located in RVS Nagar, Tirupathi Road, Chittoor District, Andhra Pradesh, India. Departments like radiology, oncology and laboratory sectors of the study hospital have been involved into the study. To finally evaluate the requirement of addition MRI scan after detection with ultrasonography to assess the staging and rate of malignancy, the number of patient downgraded from histopathological findings of malignancy to non malignancy has been performed as reported in table 3. On other hand it is seen that about 40% of cases for biopsy collection and screening can be minimized by following MRI immediately after ultrasonography reports. Further steps to manage the sensitivity poles of MRI may help in more beneficial results from performing MRI in screening breast cancer.

**Key words:** Negative Prediction Value (NPV), Positive Prediction Value (PPV), MRI, Ultrasonography, Breast cancer.

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### INTRODUCTION

Besides difficulty in survival from breast cancer, early detection of any cancer is the best way to prevent worsening of condition[1-3]. In case of patients with dense breast it is generally difficult to detect the criticality of cancer like invasive lobular cancer by performing mammography, though it was the basic method involved in screening breast cancer[4]. Thus, here took indulgence of MRI in exploring alternative screening techniques for breast cancer[5]. This MRI can be taken as an add-on diagnostic

tool for physical examination, ultrasound and mammography[6]. But, the wide use of MRI screening is limited due to its cost and variable specificities in population[7]. Despite of all these limitations MRI can be a better method of approach in women with known high risk of breast cancer, like patients diagnosed with cancer in one breast are more vulnerable for cancers in contralateral breast[8-10]. In previous studies it was reported that MRI can improve cancer detection in contralateral breast cancer in patients with initial diagnosis of cancer[11]. In other

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view it is also noted that use of MRI screening decreases the unnecessary biopsies on observing ultrasound results with solid lesions[12].

**AIMS & OBJECTIVES:**

- To perform MRI for patients with risk of breast cancer.
- To analyze and compare the results of ultrasound and MRI and report on the reliability of the same.
- To report on the accuracy and requirement of additional diagnostic aids in screening breast cancer by different tools like MRI.

**MATERIALS & METHODS:**

- Approval for the study: Institutional Ethics Committee as approved the study on submission of profound protocol of the study.
- Study population: a total of 872 patients have been enrolled into the study who were suspected to have breast cancer on physical examination and further underwent ultrasonography. Among these, 193 patients who have been reported with lesions have been included in the study to perform MRI in further.
- Inclusion Criteria:  
Patients who have been reported with lesions on ultrasound scanning, patients with known risk factors to acquire breast cancer. Patients with previous history of breast cancer in contralateral breast. Patients falling under the age group of 15 to 60 years.
- Exclusion criteria:
  - Patients with non-mass-like contrast enhancement shown in MRI
  - Patients who were already on an ongoing hormone replacement therapy.
  - Patients with medical history of biopsy
  - Patients with medical history of prior chemotherapy
  - Patients who have already undergone MRI examination
  - Male patients have been excluded from the study.

Study site & materials required: Study was carried out in RVS Institute of Medical Sciences, located in RVS Nagar, Tirupathi Road, Chittoor District, Andhra Pradesh, India. Departments like radiology, oncology and laboratory sectors of the study hospital have been involved into the study.

Statistical Information: All the calculations required for the study have been performed by using different tools like SPSS (Statistical Package For The Social Sciences), to compare the various demographics Chi-Square test has been employed.

**RESULTS & DISCUSSION:**

In all the 193 patients who have been undergone with ultrasound scan have been enrolled after completion of informed consent form signing. Various diagnostic values of MR breast imaging reporting and data systems (BI-RADS) have been assessed which included sensitivity, specificity, negative predictive value and positive predictive value as reported in table 1. BI-RADS score of which 4 is considered as abnormality, it has been furtherly divided into 4 types which included 4, 4a, 4b and 4c. 4a are of low suspicion, intermediate suspicion with 4b, moderate suspicion with 4c.

As represented in table 2, the number of patients histologically confirmed with malignancy have been analyzed and divided into 4 different BI-RADS. About 93 patients have been put under the category of mild-suspicious among which 67 patients have been histologically confirmed with malignancy, and 57 patients fell under intermediately doubted for malignancy among which 4 patients were histologically confirmed with malignancy falling to a percentage of 7.01%, among 34 patients under the category of moderate suspicion for malignancy 19 patients have been confirmed with a percentage of 55.88, and among 9 patients under the BI-RADS 4c group, 5 patients have been reported to have malignancy with a percentage of 55.5%.

To finally evaluate the requirement of addition MRI scan after detection with ultrasonography to assess the staging and rate of malignancy, the number of patient downgraded from histopathological findings of malignancy to non malignancy has been performed as reported in table 3. Among 93 patients falling under 4a category, 57 patients have been downgraded which included 75 patients with histologically benign and 18 patients of histologically malignant. And in 4b group among 34 patients with malignancy, both the patients have been furtherly listed with benign instead of malignancy. And 1 patient in 4c group has been downgraded to histologically benign.

**Table 1. Diagnostic value of MR Breast Imaging Reporting and Data System (BI-RADS)**

	Sensitivity	Specificity	Negative predictive value (NPV)	Positive predictive value (PPV)
All patients, ultrasound BI-RADS ( n = 872 )	92.31	54.2	90.4	65.6
Ultrasound BI-RADS (n = 193)	90.1	55.0	94.9	49.6

**Table 2. Histologically confirmed malignancy rates among ultrasonographic Breast Imaging Reporting and Data System (BI-RADS)**

BI-RADS classification	patient number, n	Histologically confirmed malignancy, n (%)
BI-RADS 4	93	67 (72.04)
BI-RADS 4a	57	4 (7.01)
BI-RADS 4b	34	19 (55.88)
BI-RADS 4c	9	5 (55.5)

**Table: 3 Distribution of lesions downgraded after performing MRI**

Ultrasound BI-RADS class (n)	Downgraded with MR to BI-RADS 1, 2, 3 (n)	Histologically benign (n)	Histologically malignant (n)
4a (93)		75	18
	57	50	7
4b (34)		19	14
	2	2	0
4c (9)		4	5
	1	1	0

**CONCLUSION:**

From the study it cannot be definitely confirmed that MRI is always mandatory to perform after an ultrasonography to elucidate the malignancy, as it has many limitation and sensitivity has been reported to be 92.31%, negative prediction value was of 90.4% and positive prediction value was of 65.6%. On other hand it is

seen that about 40% of cases for biopsy collection and screening can be minimized by following MRI immediately after ultrasonography reports. Further steps to manage the sensitivity poles of MRI may help in more beneficial results from performing MRI in screening breast cancer.

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