Original Article

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Determining the Indications and Role of Screening/ Diagnostic Mammography in Breast Cancer in Women below 40 Years and Contribution of Ultrasound as an Adjunct to Mammography: A Retrospective Study

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Abstract

Introduction: Many studies have assessed mammography in women over age 40 years, but little is known about its usefulness in younger women. Although screening mammograms are not generally recommended under age 40, about 29% of women between 30 and 40 reports having had one.

Aim: The purpose of this study was to retrospectively determine the indications and role of screening/diagnostic mammography in women below 40 years in breast cancer detection and contribution of ultrasound as an adjunct to mammography.

Materials and Methods: This 1-year retrospective study involved all female patients below the age of 40. All charts of these patients were reviewed for information like age of the patient, Specialty of referring physician, indication for mammography, mode of diagnosis - mammography or ultrasound or both, cyto/histopathology and any supplement information.

Results: A total of 234 women were referred for mammography. Of which the 96 (approximate 41%) of the patients were below the 40 years (17-40 years) with a mean age of 33.4 years. Indications of mammography were: (a) Presence of pain in breast with fear of cancer but without a palpable mass, (b) palpable mass, (c) an abnormality of skin or nipple, (d) follow-up mammography because of a previously detected lesion defined as probably benign, (g) non-hemorrhagic nipple discharge. Only 21/96 (22%) women had palpable mass, 14/21 (67%) lesions were occult on mammography and were seen on ultrasound only, while 7/21 (33%) lesions were seen on mammography and ultrasound both. Sensitivity of 7.2% was observed of mammography to detect lesions in young patients, while of ultrasound was 98%.

Conclusion: Mammography is less sensitive to sonography in dense breasts; therefore one can use sonography for younger age group and mammography for a later age group. Combining with sonography will result in higher sensitivity for detecting benign lesions and breast cancer.

Key words: Breast cancer, Indication, Mammography, Younger women.

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INTRODUCTION

Many studies have assessed mammography in women over age 40 years, but little is known about its usefulness in younger women. Although screening mammograms are not generally recommended under age 40. Breast cancer is diagnosed either clinically following self-breast examination

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or physical examination by healthcare personals or following screening mammography.[1] Mammography has capability of detecting non-palpable lesions, thus identifying very early breast cancer lesions and carcinoma *in situ* and hence is used as a screening toll.[2] Performance of screening mammography is known to vary by age. Younger women are more likely to experience some of the downsides of screening such as false positive or negative test results due to varied degree of density of breast parenchyma.[2,3] The use of ultrasound with mammography increases in diagnostic accuracy.[4,5]

The U.S. Preventive Task Force in new breast cancer screening guidelines dated November 17, 2009 now recommends against routine mammography screening for women before age 50 years and suggests that screening end at age 74 years. It recommends that routine screening of average risk women begin at age 50. The American Cancer Society recommends that screening begins at age 40. However, the advocacy groups like the National Breast Cancer Coalition, Breast Cancer Action, and the National Women's Health Network welcomed the new guidelines.

Regardless of the type of the breast problem, the goal of imaging studies is to rule out cancer and to address the patient's symptoms. Purpose of this study was to retrospectively determine the indications and the role of mammography still used as a screening/diagnostic tool by physicians/surgeons for detection of cancer in women under 40 and how mammography performs in the diagnosis and contribution of ultrasound as an adjunct.

MATERIALS AND METHODS

The study involved all female patients below the age of 40 who reported to the 1000 bed multispecialty SRMSIMS Hospital at Bhojipura, Bareilly, Uttar Pradesh, India between November 2013 and November 2014 for screening/diagnostic mammography.

All charts of these patients were reviewed for information like age of the patient, specialty of referring physician, indication for mammography, family history, mode of diagnosis - mammography or ultrasound or both, and any supplement information.

In the patient's record, the parenchymal density of the glandular tissue was noted. It was considered to be dense, heterogeneously dense, scattered fibro glandular tissue sufficiently spread out and intermingle with a variable amount of fat and breast with predominantly fatty component.

Mammography was performed on mammomat 1000 Siemens machine with computed radiography system. Standard cranio-caudal and medio-lateral oblique views were routinely obtained. Ultrasound was performed in all cases immediately after mammography by same radiologist reporting the mammography.

In suspected cases of malignancy/abscess on ultrasound or mammography or on both a cyto/histopathology was performed.

RESULTS

Over the 1-year, a total of 234 patients were referred to the Radiodiagnosis Department of SRMSIMS, Bareilly for mammography. The 96 (approximately 41%) of the patients referred for mammography were below the 40 years (17-40 years) and 135 (59%) of patients were above 40 years (41-84 years). The youngest patient was 17-year old (Table 1). Average age of the patients below 40 in our study was 33.4 years.

About 36.5% (35/96) were self-referred, 24% (23/96) by general surgeons, 12.5% (12/96) patients were referred by corporate sectors for health checkup, 11.5% (11/96) by gynecologist, 8.3% (08/96) by oncologists and 7.2% (07/96) by medical specialist. The highest percentage of patients was self-referred (Table 2).

Indications of mammography by referring physician were: (a) Presence of pain in breast without a palpable mass with fear of cancer, (b) palpable mass, (c) health checkup, (d) follow-up mammography because of a previously detected lesion defined as probably benign, (e) non-hemorrhagic nipple discharge (Table 3).

Approximately 41% of the patients had dense pattern on mammography, 32% had heterogeneous dense pattern, 19% scattered fibrogladular density, and 08% had predominantly fat replaced pattern (Table 4).

Largest indication (61%, 59/96) of mammography referral was pain in breast without a palpable mass with fear of cancer, and all patients in this group were above age of 20 (35% in age group 20-30 and 65% age group 30-40).

Table 1: Division of patients according to age groups

Age group (in years)	Number of patients
15-20	02
21-30	33
31-40	61
Total	96

Table 2: Division of patients according to age groups (all specialties)

Age group	Self	Surgery	Health checkup	Gynaecology	Oncologists	Medicine	Total
15-20 years	Nil	2	Nil	Nil	Nil	Nil	02
21-30 years	12	03	03	04	03	03	33
31-40 years	23	18	09	07	05	04	61
Total	35	23	12	11	08	07	96

Table 3: Division of patients according to indications for mammography

Symptoms	Total number of patients	Age group (years)		
		15-20	21-30	31-40
Presence of pain in breast without a palpable mass with fear of cancer	59	Nil	21	38
Palpable mass	20	2	08	10
Abnormality of skin/nipple with palpable mass	01	Nil	Nil	01
Follow-up mammography because of a previously detected lesion defined as probably benign	01	Nil	Nil	01
Heath checkup	12	Nil	03	09
Acute problem	02	Nil	Nil	02
Non-hemorrhagic nipple discharge	01	Nil	Nil	01
Total	96	2	32	62

Table 4: Distribution of mammographic findings of tissue densities

Frequency	Frequency	Percent
Dense	39	41
Heterogeneous dense	31	32
Scattered fibro glandular density	18	19
Predominantly fatty	08	08
Total	96	100

This category included all pattern of breast parenchyma density on mammography with predominantly dense or heterogeneously dense breast parenchyma pattern on mammography (Figures 1 and 2) that were difficult to comment or rule out the mass. These mammograms were considered negative if no mass was palpable and adjunct ultrasound examination revealed no cyst or mass lesion. Ultrasound examination with high frequency probe revealed no abnormality in 50/59 patients (84.7%), while 09/59 (15.3%) on ultrasound showed small well defined thin walled anechoic subcentimeter/centimeter size cysts favoring the diagnosis of fibroadenosis and these patients were in age group of 31-40 years. Cysts with such description were considered benign and these patients were advised yearly follow-up by ultrasonography.

Mammography evaluation of palpable abnormalities in 22% (21/96) patients showed that 1/3rd (33%) had smooth or lobulated homogeneously opaque sols with sharply defined margins which were labeled as fibroadenomas on ultrasound

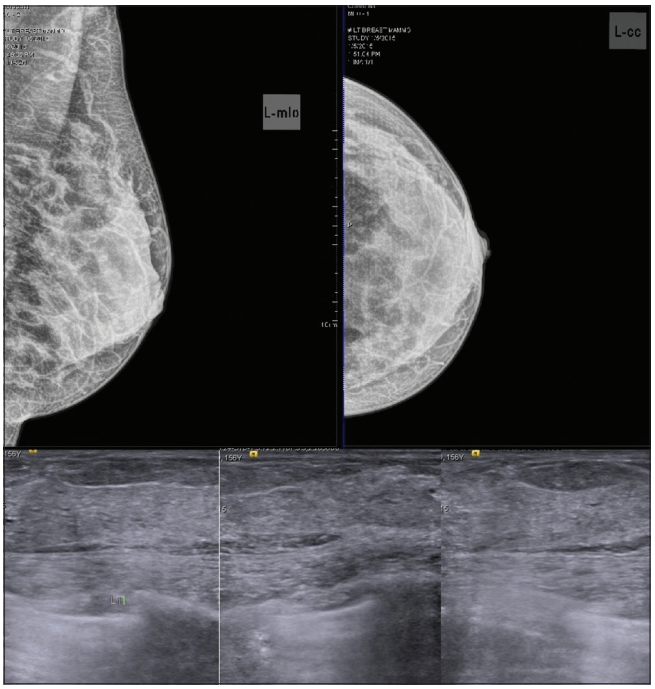

Figure 1: Normal dense breast parenchyma and ultrasound images

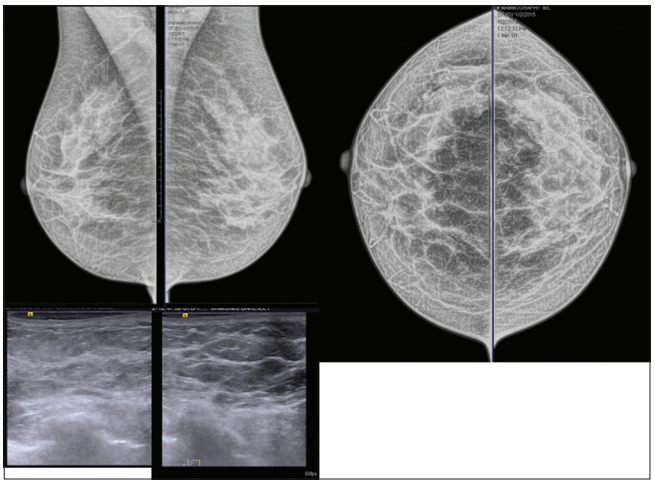

Figure 2: Normal scattered fibrogladular breast pattern and ultrasound images

(Figure 3), except one suspicious malignant lesion which showed as a radiopaque mass with nipple deformation on mammography and was also labeled as malignant on ultrasound with axillary lymph nodes and sols in liver (Figure 4). In some patients, more than two fibroadenomas

were present involving single or both breast (Figure 5). Largest fibroadenomas was of length 4.5 cm and width 3.4 cm in 17 years patient. Rest of the lesions were in the range of 1.5-2.5 cm. These had a horizontal orientation with length more than breadth and were assumed to be fibroadenomas and were classified as probably benign (Table 5). Rest of the 2/3 palpable lesions remained occult on mammography (Figure 6). In these patients, USG indicated fibroadenomas/cysts in 09/21 (43%) patients and 3/21 (14%) showed irregularly marinated infiltrating masses measuring approximately 2.5-3 cm in size with large axillary lymphadenopathy >1.5 cm and were classified as malignant and were confirmed on fine needle aspiration cytology.

While in 2/21 (10%) no lesion was detected on ultrasound. The possible explanation for non-detecting lesion on USG was, these young women were feeling a normal fibrogladular breast element between thumb and fingers as lump (Table 6). However, these were advised for ultrasound follow-up. About 71% (15/21) palpable breast masses were benign, and 19% (4/21) were malignant and in 10% (2/21) mammography was unremarkable and lesions not detected on ultrasound.

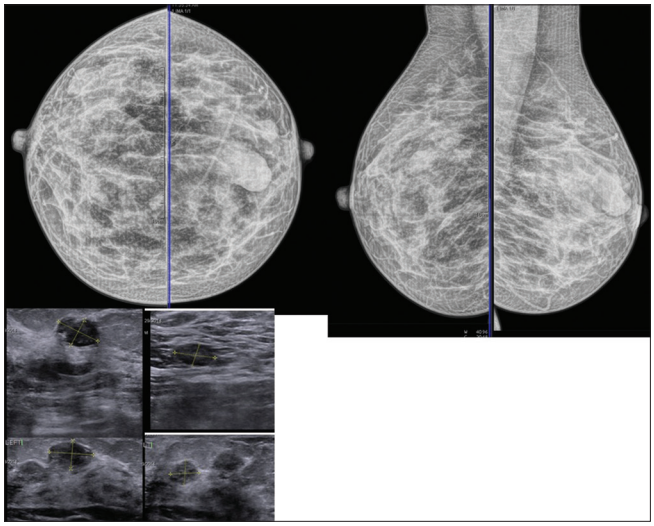

Figure 3: Mammography two well-defined radioopacites in left breast. Sonography showed sols in both breast, likely to be benign, presumed fibroadenomas

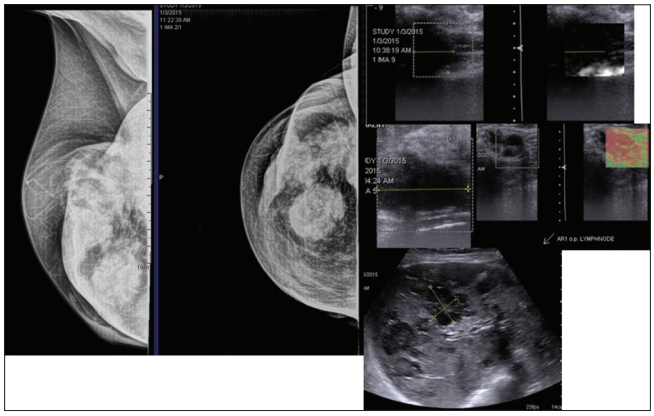

Figure 4: Mammography with sols and nipple deformation. Sonography showed masses with ill-defined margins, axillary lymph nodes and sols in liver.

All the malignant lesions were present in women aged 30, 35 and 40 years (Figure 7).

All 13% (12/96) patients with health checkup showed dense/heterogeneously dense breast parenchyma pattern and these were further examined with ultrasound. No lesion was found on ultrasound examination and only then these mammograms were considered to be negative for any lesion. Screening mammography alone in ours study was inconclusive for malignancy.

Two patients out of 96 (2%) of age 32 and 39 years presented with acute/subacute breast swelling. On mammography, breast parenchyma showed non-specific increased opacity but ultrasound revealed large irregularly marginated lesion with necrotic area. USG guided aspiration revealed the pus suggestive of abscess (Figure 8).

One patient with non-hemorrhagic nipple discharge, mammography was unremarkable, but ultrasound showed two well-defined subcentimeter size thin walled hypoechoic cysts and were classified as benign. Nipple discharge was negative for malignant cell. Patient was advised follow-up by ultrasound after 1 year.

A patient was on follow-up for probably benign lesion (fibroadenomas), the status of the lesion was same on mammography and ultrasound and she was advised to do follow-up on ultrasound.

Table 5: Mammographic findings of palpable breast abnormalities

Mammographic finding	Frequency	Percent
Occult	14	66
Cyst or fibro adenoma	06	29
Radio opaque density suspicious malignancy	01	05
Total	21	100

Table 6: Sonographic findings of palpable breast abnormalities

Sonographic finding	Frequency	Percent
Fibro-adenoma	13	62
Cyst	2	9.5
Malignant lesion/Ill defined mass	4	19
Occult/normal breast	2	9.5
Total	21	100

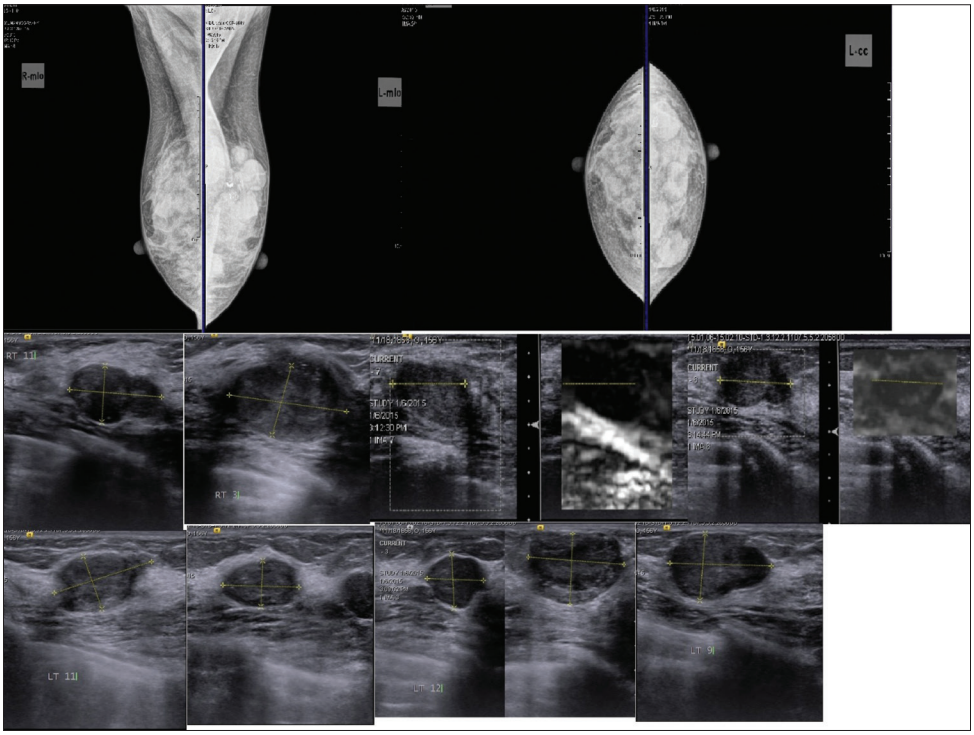

Figure 5: Mammography with multiple opacities in both breast sonography showed more number of sols in both breast, likely to be benign, presumed fibroadenomas

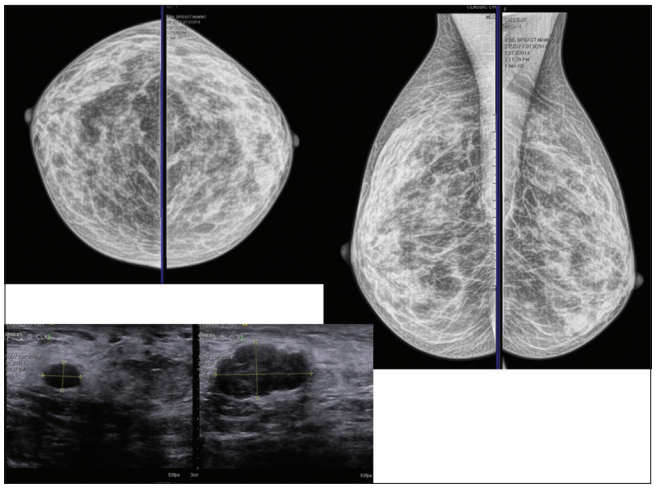

Figure 6: Mammography occult sols, sonography showed sols in both breast parenchyma, likely to be benign, presumed fibroadenomas

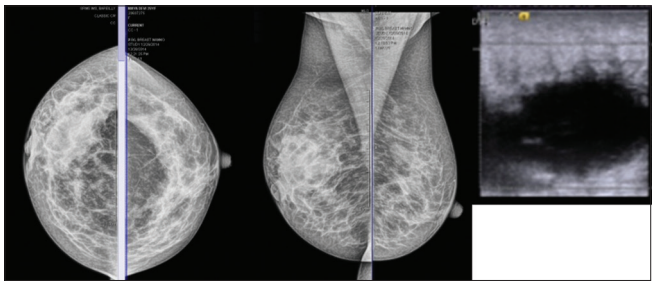

Figure 7: Mammography showed asymmetric dense parenchyma, sonography showed definite mass with infiltration. Fine-needle aspiration cytology malignant

DISCUSSION

Many studies have assessed mammography in women over age 40 years. Although screening mammograms are not generally recommended under age 40, about 29% of women between 30 and 40 report having had one.[6,7] In our study of over the 1 year a total of 96/234 patients (approximately 41%) referred for screening/diagnostic mammography, were below the 40 years. Their age group distribution in ours study was 15-20 years 02%, 21-30 years 34% and 31-40 years 64%. These patients were referred by all major specialties including self-referral. Majority of self-referred patients were for pain in breast with fear of cancer. This reflects the awareness of breast cancer in physicians/women but lack of knowledge for poor sensivity of the mammography for breast cancer or other benign conditions in young breast as well as little awareness for sensivity of USG for detecting breast lesions. In ours study even patients of age group 15-20 years. with palpable fibroadenomas was referred for mammography and not sonography.

In ours study no cancer was detected in women under 25 years. The age group of breast cancer in ours study was 30-40 years. For diagnostic mammography for palpable masses the breast cancer detection on mammography in ours study 5% while rest (14%) of the breast cancer cases were occult on mammography and in them clinical and ultrasound examination was suspicious for malignancy. The

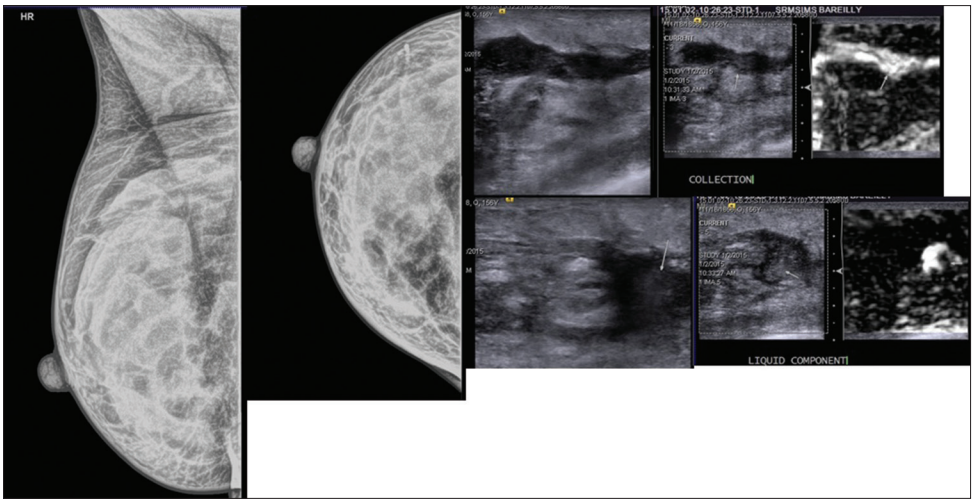

Figure 8: Mammography was non-specific, sonography showed large ill-defined heterogeneous area with necrotic component. Aspiration revealed pus

sensitivity, specificity and positive and negative predictive values of mammography depend on several factors - composition of study population, age distribution, number of symptomatic patients and tumor stage.[8,9] In our study age group, mammography sensitivity is lower due to the fact that younger women have dense breast more often, in which it is harder to find smaller tumors in the back ground of fibro glandular tissue.

In non-malignant palpable lesions, 28.3% (6/21) were visible on both mammography and sonography, but ultrasound was also very helpful in identifying these benign lesions as cystic or solid.[10,11] In some patients number of fibroadenomas noted on USG were much more than the mammography substantive the fact that some were occult on mammogram and were seen on ultrasound only. Rest of the palpable benign lesions were occult on mammogram and were detected by adjuvant sonography. Palpable breast masses are common in younger women and are usually benign.[12]

In ours study, patients with a breast lump were referred for identification of the nature of breast disease on mammography only, however without adjuvant USG the false negative rate would have been quite large. Combined mammographic and sonographic assessment was shown to be very helpful in identifying benign as well as malignant lesions causing palpable abnormalities of the breast.[13,14]

In ours study 81% palpable breast lump in younger women were benign while 19% were malignant. Meyer and Kopans in their study reported that 70-80% biopsies of palpable abnormalities were benign.

To determine the accuracy and outcomes of mammograms in younger women, Bonnie Yankaskas from the University of North Carolina at Chapel Hill, and *et al*., pooled data from six mammography registries around the country. Their study included 117,738 women who had their first mammogram between the ages of 18 and 39. They analyzed data for both screening mammograms and diagnostic mammograms, which were performed because a woman had a warning sign or symptom, such as a lump. No cancers were detected in women under 25 in their study. In women aged 35-39, the researchers found that screening mammograms had poor accuracy (sensitivity, specificity, and positive predictive value) and high rates of recall for additional tests. The cancer detection rate in this group was 1.6 cancers per 1000 women. For diagnostic mammograms, accuracy was better, and the detection rate was 14.3 cancers per 1000 women aged 35-39. In ours screening mammography study for health check-up due to the known differences in breast density at younger ages we could assess the difficulty of screening utilities of the test itself, such as a lower sensitivity and the value of adjuvant ultrasound examination which was helpful to avoid false positive or false negative mammogram.[15] Mammography should not be included for health check-up of younger asymptomatic women.

In self-referred women for mammography with fear of cancer, negative findings on combined mammography and sonographic imaging have very high specificity and are reassuring to patient and to minimize unnecessary interventions in those cases in which imaging findings are unequivocally benign.

For acute infective/inflammatory problems, ultrasound is a better modality, and the mammogram was non-contributory.

Mammography is less sensitive than sonography in dense breasts and sonography is superior to mammography

in detecting and differentiating between solid and cystic lesions.[16] In ours study sensitivity of 7.2% was observed of mammography in young patients up to 40 years of age, while of ultrasound was 98%. Therefore, one can use sonography for younger age group and mammography at a later age group, combining these modalities will result in a higher sensitivity for detecting breast diseases including cancer.

CONCLUSION

Younger women have very low breast cancer rates. Ultrasound to be used as first modality in younger age group with palpable masses. Screening mammography should not be included for health check-up of younger asymptomatic women and to be reserved for older age group. Mammography without adjuvant ultrasound in younger age group will have a poor performance. The referring physician and surgeons needs to be aware of these facts.

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