

Is it time to explore ultrasonography as a viable option for breast screening of young Indian women?

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Abstract

Introduction This article focuses on issue of breast cancer among young women from India and what can be done for its screening.

Methods Search was done in Medline, google scholar and google to look for relevant articles.

Results Cancer cases are increasing in younger women and since their breasts are dense mammography which is a standard screening test is not of much relevance in this age group. Role of ultrasonography in screening dense breasts has been studied in a few settings and found to be promising.

Conclusions In a low resource country like India if efficacy of ultrasound for screening of young women can be studied it may be a viable option for screening them in the future.

Key words ultrasonography, breast, young women, India, dense breasts

Introduction

More and more cases of breast cancer are being reported from women less than 40 years of age from India. This is the age group which does not attend any formal screening programme for breast cancer. Since breasts of young women tend to be dense, and mammography is not recommended for screening in this age group, for a low resource country like India may be it is time to explore the role of ultrasonography for screening of breast cancer.

Material and methods

Relevant article were searched for in PubMed, google scholar, google for the purpose of this article. Search was done using key words like: breast cancer in young women, trends of breast

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cancer in India, dense breasts, ultrasound for dense breasts, benefits of ultrasound for breast.

Results and discussion

Breast cancer is on the rise in developing countries and so is the mortality due to it. There is no organized screening programme run by health agency or government for early detection of breast cancer in most of these countries. It has been observed that over the years the trend of this disease has changed. Among the Asian population, 32-year population-based analysis of incidence rates of breast cancer in young women indicated a steady increase in the overall and age specific rates of breast cancer in young women. The rate of increase was very high during the period of 1980-1990[1]. Most of the Indian cancer registries especially from Mumbai and Bangalore have shown a steep increase in age specific breast cancer incidence during premenopausal years (age 15-49) after which the rates plateau and this pattern is typical of more traditional societies[2]. A study conducted in 2003 at a cancer hospital in Delhi reported that breast cancer was most prevalent in the 30-40 year age group, accounting

for 40% of cases [3]. At Tata Memorial Hospital (Mumbai), one of the largest cancer hospitals in India with a hospital based cancer registry, 63% of cases were in premenopausal women (ages 15-49)[4]. These observations reflect both the young age at diagnosis and the large number of younger people in Indian populations, where proportionately fewer women are in the over 60 age group. In a study done by Raina et al at All India Institute of Medical Sciences, Delhi young women constituted 8% of breast cancer cases, this proportion is higher than the published western figures of 1-2%[5]. Deshmukh *et al.*, observed the incidence of breast cancer to be 14.8% in their study in which data between June 2008 and 2011 was compiled [6].

In Ahmadabad city, a staggering 32.5% of the women cancer patients in the city have cancer of the breast. Further, data with population-based cancer registry reveals that currently breast cancer is more common in the younger women. In Ahmadabad, 50% of all the breast cancer cases are in the age group of 25 to 50 years. A few decades back, breast cancer in the city was more common among women over 50; 65% to 70% patients were above 50 years and only 30 to 35% women were below 50 years of age[7].

In a study conducted by Attam *et al.*, in Delhi, high mammographic density patterns was observed to be associated with the increase risk of development of breast cancer in the younger women in a low risk population whereas no such increase was seen in postmenopausal women [8].

Over the years it has been felt by the radiologists that dense breast tissue of young women is difficult to interpret accurately with the mammographic imaging hence making mammography an unsuitable tool to screen their breasts. Instead they have been relying on ultrasonography to radiographically visualize the breasts of young women. One is not very sure of sensitivity and specificity of ultrasound in young women to be able to confidently use it as a screening tool. Many claim it should be combined with a mammogram or an MRI. At present, there

is no conclusive evidence which definitively proves that ultrasound screening alone lowers mortality rates for breast cancer, unlike mammography. Procedure of breast ultrasound is similar to an ultrasound of the abdomen with which most of the women are familiar. A small wand like instrument is used after applying the gel to visualize the different areas over the breast. First on one side and then on the other. It is a painless procedure and there is no exposure to X-rays. On an average it takes half an hour to do an ultrasound but if a suspicious mass is seen then in that case the radiologist might take more time to decipher that spot. An ultrasound can differentiate between cysts, common calcifications, breast tumours, and more. Further tests are usually done to confirm the details of the lesion visualized on ultrasound. Ultrasounds can catch approximately 87 percent of breast cancer masses what this means is, if you have breast cancer, an ultrasound will typically find it. Although this is a very good percentage but still ultrasounds are 100% fool proof but it helps in getting to an accurate diagnosis [9].

Typically a sonogram has been used to differentiate a fluid filled cyst from other solid masses. Liquid masses (cysts) tend to be darker in colour, and homogenous. Over the years radiographers who perform dedicated breast ultrasounds can distinguish between different textures and characteristics of the margins noticed while doing an ultra-sonogram. This helps determine whether a lesion is cancerous or benign. Benign lumps are usually round and oval with a definite margin whereas cancerous lumps do not have a well-defined margin. The gold standard test to comment on whether a lump is cancerous or benign requires a breast biopsy. As some of the benign looking fibrous nodule or complex cyst may turn out to be malignant in about 15% a biopsy should be considered [10].

Researchers at the Radiological Society of North America (RSNA) 98th Scientific Assembly and Annual Meeting reported that in countries where incidence of breast cancer and mortality are increasing along with scarce mammography

screening facilities, ultrasound should be considered as a screening tool. It could be more affordable and convenient as compared to mammography [11].

Data from the Avon Foundation for Women and National Cancer Institute-sponsored ACRIN 6666 study found that adding ultrasound or MRI screening to annual mammograms enhanced cancer detection capability. The researcher's team evaluated ultrasound as the primary screening method, taking into consideration cancer detection, patient recalls, and biopsies performed and whether those biopsies showed breast cancer. They found that breast cancer detection with ultrasound alone compared quite favorably to mammography alone and was actually better at detecting early invasive breast cancers. [12].

Breast ultrasound is usually done to evaluate an abnormality discovered on a clinical breast examination or a diagnostic mammography or in a young patient as a first "look in test". To compare ultrasound and mammography in women with symptoms of breast cancer, Dr. Nehmat Houssami of the University of Sydney, Australia and colleagues enrolled 240 women from a breast clinic, all of whom were found to have breast cancer. The researchers then enrolled an additional 240 women from the clinic who were found not to have breast cancer despite having breast lumps or similar symptoms. All of the women were examined with both ultrasound and mammography.

The results showed that, overall, there was not a statistically significant difference in the effectiveness of ultrasound versus mammography for detecting breast cancer. Breast cancer was accurately found with ultrasound in 81.7% of the women, compared to 75.8% with mammography.

However, Dr. Houssami and his colleagues did find ultrasound to be more accurate at detecting breast cancer in younger women (45 years of age or younger). Among these women, ultrasound accurately detected 84.9% of breast cancers,

compared to 71.7% of cases detected with mammography alone. It may be explained by the fact that density of the breast hides the lesion under them and hence it cannot be visualized on mammography. Based on the finding of the study, the researchers conclude that ultrasound may be more effective than mammography at detecting breast cancer in younger women with cancer symptoms and may be considered as the initial test for these women.

While ultrasound has excellent contrast resolution, it has a few limitations which prevent it from being considered as a standalone screening tool for breast cancer like ultrasound does not have good spatial resolution like mammography, and therefore cannot provide detailed images as a mammogram would. Ultrasound is also unable to image micro calcifications, tiny calcium deposits that are often the first indication of breast cancer. Although it may be able to detect macro or large calcifications in some cases [13].

Off late, ultrasound has now been considered as a screening modality for women who are notified to be having dense breasts. Even national level bill has been introduced in the House of Representatives to this effect. This provides a new challenge for healthcare providers to find a way to work with ultrasound for these patients.

A lot of research and hard work has been going over many in the background to improve the technique of doing ultrasound. New automated breast ultrasound systems (ABUS) have been developed and they address some of the limitations of a hand held ultrasound machine. In the year 2012, one of the ABUS machines, sono-v ABUS system developed by U-Systems, even got the approval of FDA for use in screening asymptomatic women with dense breasts as an adjunct to mammography [14].

Dr. Constance Lehman of Public Health Sciences, SCCA, and UW Department of Radiology, and colleagues, undertook a study to compare the accuracy of breast ultrasound *versus*

mammography in women ages 30-39 who were experiencing focal breast symptoms. They used medical records to identify women who underwent both ultrasound and mammogram, excluding those with non-focal symptoms, or those who were undergoing follow-up for a screening mammogram or for a known cancer. They identified breast cancer outcomes via linkage to tumor registry, requiring at least 24 months of follow-up time.

1208 cases of focal breast symptoms were included, in a total of 954 women (some women had multiple instances of symptoms; these were included separately). Of these, 23 (1.9%) were determined to be breast cancer; the rest were benign. Ultrasound was highly sensitive in this population of symptomatic younger women, detecting 95.7% of the cancers, versus mammography, which detected only 60.9% of the cancers. The negative predictive value was 99.9% for ultrasound and 99.2% for mammography, meaning that approximately 1 out of 1000 such women would have a false negative test result (*i.e.* a cancer would be missed) by ultrasound, *versus* approximately 1 out of 250 such women would have a cancer missed by mammogram.

Even among symptomatic women at this younger age, the occurrence of breast cancer is relatively low (1.9%). But ultrasound appears to be more effective at catching these cancers than mammograms, because breast tissue is so much denser in women ages 30-39. Investigators conclude that mammograms add very little whereas ultrasound has great utility, indicating that perhaps ultrasound, and not mammogram, should be the recommended imaging technique in women ages 30-39 with focal breast symptoms [15].

With the increasing trend of breast cancer in the young population whose breasts are dense usual screening modality like mammography may not be the answer.

For early detection of breast cancer along with awareness early diagnosis by screening has a vital

role to play. Mammography is established as an effective screening modality in high-income countries, where it is credited with a significant contribution to the reduction in breast-cancer mortality, it is generally accepted to be unaffordable in low-income countries because of the level of infrastructure and human resources needed to establish programmes and make them sustainable [16]. X-ray mammography (XRM) is the only imaging modality that is widely used for breast cancer screening. However, increased breast tissue density is the most significant factor limiting the effectiveness of mammographic screening with about 35 per cent of breast cancers in women with dense breasts going undetected by mammogram and approximately 40 per cent of women who participate in organized mammography screening have dense breast tissue [17]. The limitations of mammography in detecting noncalcified small invasive cancers hidden within the dense fibroglandular tissue calls for an adjunct screening device that would compensate for this deficiency [18].

In what has been considered as the largest analysis of breast methods for women under the age of 40, researchers at the Seattle Cancer Care Alliance (SCAA) and University of Washington put mammography and ultrasounds to the test they identified 1208 cases in 954 patients. Outcomes were benign in 1185 of 1208 (98.1%) and malignant in 23 of 1208 (1.9%) cases. Sensitivities for ultrasound and mammography were 95.7% and 60.9%, respectively. Specificities for ultrasound and mammography were 89.2% and 94.4%, respectively. NPV was 99.9% for ultrasound and 99.2% for mammography. PPV was 13.2% for ultrasound and 18.4% for mammography. According to the researchers here; ultrasound has high sensitivity (95.7%) and high NPV (99.9%) in this setting and should be the primary imaging modality of choice. The added value of adjunct mammography is low [19].

These findings hope to prompt health officials to revise the current U.S. clinical practice guidelines, for women under 40 in whom ultrasound is better

at evaluating breast lumps as compared to mammography. Revised guideline may be similar to those in Europe where ultrasound is often recommended as a first course of screening for women under age 40.

Conclusions

With the increase in cases of breast cancer in India and especially more so in the young women whose breasts are usually dense, maybe it is time to explore the possibility of ultrasonography as a modality for screening of breast.

Conflict of interest

The authors declare that there is no conflict of interests

Authors' Contribution

AK: did the literature search, prepared the document and did the final editing.

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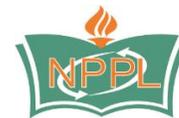
References

1. Keramatinia A, Mousavi-Jarrahi SH, Hiteh M, Mosavi-Jarrahi A. Trends in incidence of breast cancer among women under 40 in Asia. *Asian Pac J Cancer Prev*. 2014; 15(3):1387-90. [PubMed]
2. Yeole BB, Kurkure AP. An epidemiological assessment of increasing incidence and trends in breast cancer in Mumbai and other sites in India, during the last two decades. *Asian Pac J Cancer Prev*, 2003; 4: 51-6. [PubMed]
3. Goel A, Bhan CM, Srivastava KN. Five year clinicopathological study of breast cancer. *Indian J Med Sci*, 2003; 57:347-9. [PubMed]
4. Desai SB, Moonim MT, Gill AK. Hormone receptor status of breast cancer in India: a study of 798 tumours. *Breast*, 2000; 9: 267-70. [PubMed]
5. Raina V, Gogia A, Mohanti BK, Deo SVS, Shukla NK, Sreenivas VK. *J Clin Oncol* 2013; 31, (suppl; abstr e12539) <http://meetinglibrary.asco.org/content/116044-132> [Last accessed on October 4, 2014].
6. Deshmukh SP, Mane AD, Zade BP, Sane SP. 265 P. Breast cancer in young women in India, ESMO Congress 2012, 01 October 2012. <http://oncologypro.esmo.org/Meeting-Resources/ESMO-2012/Breast-cancer-in-young-women-in-India> [Last accessed on October 4, 2014].
7. Mishra P. Breast cancer striking young women in Ahmedabad, TNN | Jan 9, 2014, <http://timesofindia.indiatimes.com/city/ahmedabad/Breast-cancer-striking-young-women-in-Ahmedabad/articleshow/28597342.cms> [Last accessed October 4, 2014]
8. Attam A, Kaur N, Saha S, Bhargav SK. Mammographic as a risk factor for breast cancer in a low risk population. *Indian J Cancer* 2008; 45: 50-53. [PubMed]
9. Ruddy KT. What you should know about a breast ultrasound vs. mammogram. <http://breastcancer.answers.com/diagnosis-and-tests/what-you-should-know-about-a-breast-ultrasound-vs-mammogram> [Last accessed November 8, 2014]
10. Halls SB. The benefits of using ultrasound in screening for breast cancer. http://www.breastcancer.ca/screening/ultrasound-screening_benefits.htm last updated 17th March 2011 [Last accessed November 8, 2014]
11. Lowry F. Ultrasound a viable screening option for breast cancer. http://www.medscape.com/viewarticle/775503Dec_03_2012. [Last accessed November 8, 2014].
12. Kris B. Mamula Ultrasound effective in cancer screening Nov 26, 2012, 11:09am EST http://www.bizjournals.com/pittsburgh/news/2012/11/26/ultrasound-effective-incancerscreening.html?iana=ind_ins [Last accessed November 8, 2014].
13. Houssami N, Irwig L, Simpson JM, McKessar M, Blome S, Noakes J. Sydney Breast Imaging Accuracy Study: Comparative sensitivity and specificity of mammography and sonography in young women with symptoms. *AJR Am J Roentgenol*. 2003 Apr; 180(4):935-40. [PubMed]
14. Kathy Hardy Ultrasound Screening — Establishing Its Role in Women With Dense Breast Tissue. *Radiology Today* March 2014 Vol. 15 No. 3 P. <http://www.radiologytoday.net/archive/rt0314p10.shtml> [Last accessed November 8, 2014].
15. Lehman CD, Lee CI, Loving VA, Portillo MS, Peacock S, Demartini WB. Accuracy and value of breast ultrasound for primary imaging evaluation of symptomatic women 30-39 years of age. *Am. J. Roentgenol* 2012; 5:1169-77. [PubMed]
16. Panieri E. Breast-cancer awareness in low-income countries. *Lancet Oncol*. 2013 Apr; 14(4):274-5. doi: 10.1016/S1470-2045(13)70020-2. Epub 2013 Jan 31. [PubMed]
17. Boyd NF, Guo H, Martin LJ, Sun L, Stone J, Fishell E, Jong RA, Hislop G, Chiarelli A, Minkin S, Yaffe MJ. Mammographic density and the risk and detection of

- breast cancer. N Engl J Med. 2007 Jan 18; 356(3):227-36..[[Pubmed](#)]
18. Lander MR, Tabár L. Automated 3-D breast ultrasound as a promising adjunctive screening tool for examining dense breast tissue. Semin Roentgenol. 2011 Oct;46(4):302-8. doi: 10.1053/j.ro.2011.06.003. [[Pubmed](#)]
 19. Lehman CD, Lee CI, Loving VA, Portillo MS, Peacock S, DeMartini WB. Accuracy and value of breast ultrasound for primary imaging evaluation of symptomatic women 30-39 years of age. AJR Am J Roentgenol. 2012 Nov; 199(5):1169-77. doi: 10.2214/AJR.12.8842. [[Pubmed](#)]
 20. Breast Cancer Detection under Age 40: Are Mammograms Or Ultrasounds More Effective? Posted: 10/23/2012 10:24 am EDT Updated: 10/23/2012 1:55 pm EDT, May 22nds 2014,Huff Posthttp://www.huffingtonpost.com/2012/10/22/breast-cancer-detection-under-40-mammogram-or-ultrasound_n_2003433.html[Last accessed November 8, 2014].



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