Mammographic breast density patterns and role of supplemental screening by ultrasound

C Vikas[1], Ch Sushma[2]

[1]Professor, [2]Postgraduate student, Department of Radiology, Prathima Institute of Medical Sciences, Karimnagar, Telangana, India.

Address for correspondence: Dr Ch Sushma,Postgraduate student, Department of Radiology, Prathima Institute of Medical Sciences, Karimnagar, Telangana, India.

Email : sushma.pinky12041204@gmail.com

ABSTRACT

Objective: To study"breast density patterns on mammography" in local population, to analyse the need for supplemental screening by high resolution ultrasound of both breasts, to compare obtained density patterns with other populations and finally to contribute my data to the authorised baseline data.

Materials and Methods : Female patients above age 30 years who are referred to department of Radiology, Prathima Institute of Medical Sciences, for mammography on senographe DMR model of GE MAMMOGRAPHY machine of 0.5mm Pb equivalent thickness,40 to 100 mA range, grid ratio of 30:1.These patients were evaluated for density patterns according to BIRADS lexicon , fifth edition and were subjected to high resolution ultrasound breast on Phillips Affinity 70 ultrasound machine . Patients belonging to the local population and are chosen between the study period of June 2016 to January 2017 and of sample size 50 .

Results : A total number of 50 patients who were subjected to mammography and high reso-lution ultrasonography of both breasts, 44% of our study group had dense breasts(among which 14%had heterogeneously dense breasts and 8% had extremely dense breasts),56%had non dense breasts(among which 24%had fatty breast and 16% had scattered fibroglandular breasts) according to BIRADS Lexicon of fifth edition.Among these dense breasts(of total 44%) 54.54% of them were negative for any kind of lesion on mammography but ultrasound showed positive findings in them.

Conclusion : The results of our study group suggest that in woman with dense breast pattern on mammography , more than half of them are negative for any kind of lesion may it be be-nign or malignant on mammogram, where ultrasound displayed positive findings.Hence supplemental screening with ultrasound is also an option adjunct to mammography.

Keywords : Breast density,BIRADS,mammography,high resolution ultrasound.

INTRODUCTION

Breast density is different from clinical aspect of firmness of breast. Mammographic breast density is attributed to the relative amount of fibroglandular connective tissue excluding fat.

Types of mammographic breast densities :

ACR(American college of radiology) introduced the BIRADS (BREAST IMAGING REPORTING AND DATA SYSTEM)lexicon in1993 to customise mammographic reports which previously did not have any set of rules to abide.Many revisions of BIRADS classification was been made.In Fourth edition of BIRADS lexicon breast density is classified based on the percentile of fibroglandular connective tissue as <25% almost entirely fatty, 25%–50% as scattered areas of fibroglandular density, 51%–75% as heterogeneously dense and >75% as extremely dense breasts.Though the density descriptors are same in both fourth and fifth editions of BIRADS lexicon, fifth edition[1] abolished percentiles and attributed the density descriptors to subjective interpretation (Figure 1).

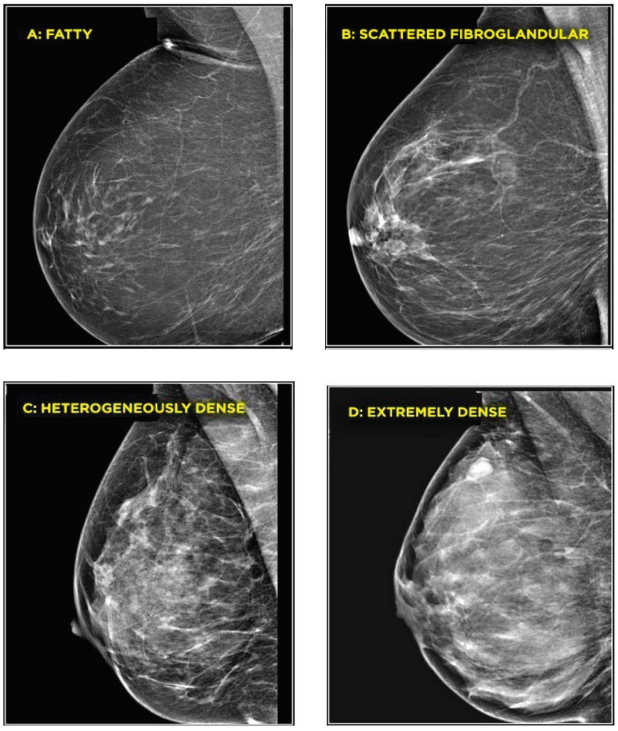


FIGURE 1: BIRADS BREAST DENSITIES ON MAMMOGRAPHY

On mammogram fibroglandular tissue appears as radio dense where as fatty tissue appears as radiolucent or dark areas.Breast densities can be broadly classified as "Dense breasts and Non dense breasts". Dense breasts by combining heterogeneously dense and extremely dense together and Non dense breasts by combining fatty and scattered fibroglandular densities.As breast density is subjective according to fifth edition of BIRADS lexicon there will be variations in classification and interpretation. So here comes the role of standardised quantification of breast density. There are various methods of quantification of breast density like dual

energy mammography,spectral mammography,3D MRI,volumetric breast density maps.[2,3] Digital breast tomosynthesis,optical imaging, ultrasound imaging etc.

Breast density is not a static factor. It varies with body mass index[3], age, drugs, hormone re-placement therapy etc.Importance of breast density lies in understanding its effects i.e, by obscuring the visualisation of radio dense breast lesions against radio dense background called "masking effect" and breast density itself is a risk factor for breast cancer develop-ment [3,4,5.] To overcome this masking effect of breast density, there are additional imaging tools for dense breasts like Digital Mammography, Digital Breast Tomosynthesis, high resolution breast ultrasound, breast Magnetic resonance imaging. Among which ultrasound[6] is less time consuming of 7-10 min, easily available, less expensive, doesnot obviate for contrast and can be subjected simultaneously for elastography as well.

In a breast density comparative study of other populations like in Americans,Africans, lebanons[7] tells that in general Asians[8] have dense breast patterns.In a study among Indian population breast density showed inverse relation with age.[9,10].

MATERIALS AND METHODS

This is a prospective study taking female patients above age 30 years who are referred to de-partment of Radiology, Prathima Institute of Medical Sciences, for mammography by various clinical departments. The study was done on 50 patients. These patients are subjected for mammography on senographe DMR model of ge Mammographic machine of 0.5mm Pb equivalent thickness,40 to 100 mA range, grid ratio of 30:1. These females were evaluated for density patterns according to BIRADS lexicon fifth edition and were subjected to high resolution ultrasound breast on phillips affinity 70 ultrasound machine. Patients belong to the local population and are chosen between the study period of june 2016 to january 2017.

RESULTS

In our study conducted among 50 females above age 30 years, 44% (22 out of 50 cases) had dense breasts of which 63.63%(14 out of 22)had heterogeneously dense pattern - BIRADS BREAST DENSITY III,36.37%(8 out of 22)had extremely dense breasts- BIRADS BREAST DENSITY IV and 56%(28 out of 50)had non dense breasts of which 42.85%(12 out of 28)had fatty breast -BIRADS BREAST DENSITY I and 57.14%(16 out of 28)had scattered fibroglandular density pattern -BIRADS DENSITY II(Table1). Nearly at about half of our study population are having dense breast pattern and inverse relation of density pattern to agecategory represented in pie diagram and in bar diagram(Fig 2 & Fig 3)

Table1- Breast density patterns in our study group

BREAST DENSITY PATTERN	NO.OF CASES OUT OF TOTAL 50 CASES	PERCENTAGE	CATEGORY
FATTY BREAST	12	24%	NONDENSE BREAST
SCATTERED FIBROGLANDULAR	16	32%	NONDENSE BREAST
HETEROGENOUSLY DENSE	14	28%	DENSE BREAST
EXTREMELY DENSE	8	16%	DENSE BREAST

FIGURE 2: Showing categorisation of mamographic density pattern of the study group into dense breasts and non dense breasts in a Pie Diagram

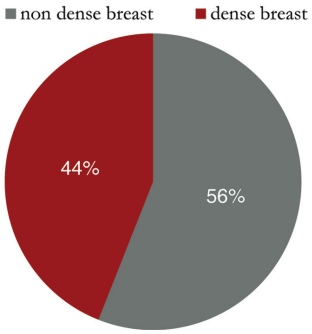
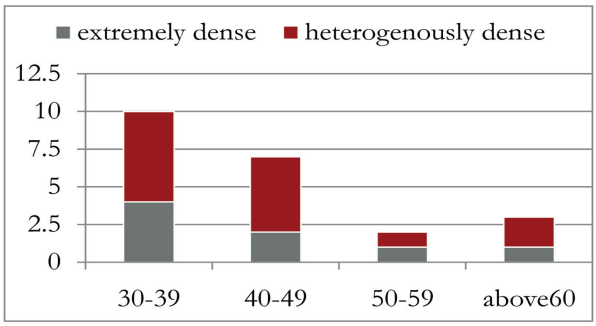


FIGURE 3: SHOWING BAR DIAGRAM SHOWING DEMOGRAPHIC DISTRIBUTION OF DENSE BREAST PATTERN

X AXIS: AGE: Y AXIS:NUMBER OF CASES



DISCUSSION

Among this mammographically dense breast population of 44%(22 out of 50),54.54% (12 out of 22) on mammography had negative or normal findings for any kind of lesion may it be be-nign or malignant, in whom high resolution ultrasound showed positive result by picking up a lesion either benign or malignant.Among this mammography negative and ultrasound positive cases 62.50% are having extremely dense breasts and 50% are having heterogeneously dense breasts.Which means that in whole the dense breast pattern mammography is negative for any kind of lesion in extremely dense breasts when compared to heterogeneously dense breasts.

Calculating the sensitivity and specificity of high resolution ultrasound breast taking mam-mography as superior screening test ultrasound is able to pick up almost of all positive cases but can detect only a half of true negative cases, which means it is only sensitive but not specific for malignant lesions.

Demographic division of our study group is 13 cases in the age group of 30-39 years,15 cases in the age group of 40-49years,10 cases in 50-59years,12 cases in 69years and above.Of which 76.92%(10 out of 13) in 30 to 39 age group,53.33%(8 out of 15) in 40-49age group,20%(2 out of 10)in 50 to 59 age group,33.33%(4 out of 12) in above 60 age group had dense breast pattern, which tells that majority of dense breasts are noticed in age groups of 30 to 49 years .(Fig 3).

When compared with other populations our study group showed more dense breast patterns and inverse relationship of density pattern with age i.e.,dense breast pattern is seen in less numbers with increasing age.

CONCLUSION

To conclude at about half of our study population are having dense breast pattern and inverse relation of density pattern to age. In these woman with mammographic dense breast pattern just more than half of them are negative for any kind of lesion may it be benign or malignant on mammogram, where ultrasound displayed positive findings. Hence supplemental screening with ultrasound is also an option adjunct to mammography for early detection of any kind of lesion may it be benign or malignant and for prompt treatment response.

REFERENCES

1. D'Orsi C, Sickles EA, Mendelson EB, Morris EA. Breast Imaging Reporting and Data System: ACR BI-RADS breast imaging atlas. 5th ed. Reston, Va: American College of Radi-ology, 2013.
2. Baglietto L, Krishnan K, Stone J, et al. Associations of mammographic dense and non-dense areas and body mass index with risk of breast cancer. Am J Epidemiol 2014;179(4):475–483.
3. Bertrand K. A, Scott C. G, Tamimi R. M., et al. Dense and nondense Mammographic area and risk of breast cancer by age and tumor characteristics. Cancer Epidemiology Biomarkers and Prevention 2015;24(5):798–809. doi: 10.1158/1055-9965.EPI-14-1136.
4. Pettersson A, Tamimi RM. Breast fat and breast cancer. Breast Cancer Res Treat. 2012;135(1):321–323.
5. Martin L. J., Melnichouk O., Guo H., et al. Family history, mammographic density, and risk of breast cancer. Cancer Epidemiology Biomarkers and Prevention 2010;19(2):456–463. doi: 10.1158/1055-9965.EPI-09-0881.
6. Nystrom L, Andersson I, Bjurstam N, et al. Long-term effects of mammography screening: updated overview of the Swedish randomized trials. Lancet 2002; 359:909–919.
7. Christine Salem, David Atallah, Joelle Safi, et al. Breast Density and Breast Cancer Incidence in the Lebanese Population: Results from a Retrospective Multicenter Study. BioMed Research International 2017; Article ID 7594953, 9 pages. https://doi.org/10.1155/2017/7594953.
8. Wong CS, Lim GH, Gao F, et al. Mammographic density and its interaction with other breast cancer risk factors in an Asian population. Br J Cancer. 2011;104(5):871–874.
9. Singh T, Khandelwal N, Singla V, et al. Breast density in screening mammography in In-dian population - Is it different from western population?. Breast J 2018;24:365–368.
10. Marcela G. del Carmen, Elkan F. Halpern, Daniel B. Kopans, Beverly Moy, Richard H. Moore, Paul E. Goss, and Kevin S. Hughes. American Journal of Roentgenology 2007 ; 188(4) 1147-1150.

How to cite this article : Vikas C, Sushma Ch. Mammographic Breast density pat-terns and role of supplemental screening by ultrasound. Perspectives in Medical Research 2019; 7(1):21-23.

Sources of Support: Nil,Conflict of interest:None declared.