Cancer Medicine Journal

Research Article | Vol 5 Issue S5

Mammographic Breast Density Pattern Among Women in Owo, Nigeria

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Received: April 2, 2022; Accepted: April 18, 2022; Published: April 25, 2022

ABSTRACT

BACKGROUND

Mammography is an important breast imaging technique which is useful in the diagnosis of breast disease. Breast density has effect on the development and the risk factors for breast cancer. This is a retrospective study which determined the mammographic breast density pattern in women using the qualitative assessment method BIRAD classification to provide baseline data in this regard.

AIM

The study also aimed to determine the correlation of breast density pattern with socio- demographic characteristics of the women in the study population.

METHODS

This is a retrospective study which took place at the Department of Radiology, Federal Medical Centre, Owo. It covered the period between January, 2018 and December, 2020. Prior to commencement of the study, approval was obtained from the Health Research Ethics Committee of Federal Medical Centre, Owo. Relevant records including mammographic reports and films were obtained from the mammographic unit of Department of Radiology Federal Medical Centre, Owo. Data obtained was analyzed with the aid of statistical package for social science version 22.

RESULTS

The records of two hundred and eight five (285) women were used in this study. The ages of the study patients ranged from 23 years - 80 years (48.2+- 8.9). Most subjects; 135 (47.4%) had scattered fibro glandular breast density pattern (BIRADS 2) while 109(38.2%) had heterogeneously dense breast density pattern (BIRADS 3).

CONCLUSION

Less than half of the study population had dense breast density pattern. There was no statistically significant association between BIRADS classification and selected socio-demographic/clinical variables.

Citation: C Adebiyi, Mammographic Breast Density Pattern Among Women in Owo, Nigeria. Cancer Med J 5(S5): 46-52.

KEYWORDS

Breast density; Mammography; Breast cancer; Women; Nigeria

INTRODUCTION

Breast density refers to the amount of fibro-glandular tissue in relation to fatty tissue within the breast. The composition of breast tissue varies in women. It is affected by endogenous factors like age, parity, body mass index, and ethnicity. Some exogenous factors like smoking, alcohol, obesity, and sedentary lifestyle, oral contraceptives and hormone replacement therapy affects breast density. It has been reported that breast density affects the risk for breast cancer in different ways [1]. Women with highest breast density pattern have been reported to have 2 times to 6 times higher risk in developing breast cancer as opposed to those with lowest breast density pattern [2]. There is reduction in sensitivity of mammography in detection of breast cancer with increasing breast density [3,4].

The dense tissue in the breast radiographically represents stroma and epithelium whereas the lucent tissue represents fat [5].

With increasing age, the amount of stroma and epithelium decreases while the amount of fat increases [6]. Thus, there is reduction of breast density with increasing age [7].

Previous studies have shown marked reduction in the relative densities of the mammographic pattern in middle aged women which coincide with the age at menopause [8].

There is paucity of data on the mammographic breast density pattern in south-west Nigeria. The authors are not aware of any previous study on this subject matter in our centre.

This study aimed to retrospectively determine the mammographic breast density pattern in women using the qualitative assessment method; BIRAD classification to provide baseline data in this regard.

The study also aimed to determine the correlation of breast density pattern with socio- demographic characteristics of the women in the study population.

MATERIALS AND METHODS

This is a descriptive retrospective study carried out at FMC, Owo which covered the period between January, 2018 and December, 2020. Prior to commencement of the study, approval was obtained from the Health Research Ethics Committee of Federal Medical Centre, Owo.

Relevant records including mammographic reports and films were obtained from the mammographic unit of Department of Radiology, Federal Medical Centre, Owo.
The parameters obtained from the clients records included age (years), parity, menopausal status, history of hysterectomy, fertility drug use, family history of breast cancer, previous history of breast cancer and baseline/follow up mammography. The ACR - BIRAD category was also extracted.

The American College of Radiology (ACR) established the Breast Imaging Reporting and Data System (BIRADS) classified mammographic breast density pattern into four categories as stated below [8].

Birads Category	Breast Pattern
1	Fatty
2	Scattered fibro - glandular
3	Heterogeneous fibro - glandular
4	Extremely dense

The cases reviewed were accompanied by films and each mammogram was re-assessed by the radiologists with the aid of viewing boxes to determine the mammographic breast pattern.

The radiologists were oblivious of the previously documented mammographic breast density report and the mammographic breast density pattern.

The data obtained were entered and analyzed with the aid of SPSS version 22.

RESULTS

The records of two hundred and eighty-five (285) women were used in this study.

Variable	Frequency	Percentage
Age group (years)		
20 - 29	3	1.0
30 - 39	43	15.1
40 - 49	118	41.4
50 - 59	88	30.9
60 - 69	29	10.2
70 - 79	3	1.0
80 - 89	1	0.4
Mean age	**48.2**	**8.9***
Parity		
Nulliparous	16	5.6
Parous	269	94.4
Previous mammogram		
Yes	51	17.9
No	234	82.1
Previous physical exam		
Yes	154	54.0
No	131	46.0
Post-menopausal status		
Yes	118	41.4
No	167	58.6
Previous hysterectomy		
Yes	6	2.1
No	279	97.9
Birth control/Fertility drugs		
Yes	50	17.5
No	235	82.5
Hormonal therapy		
Yes	14	4.9
No	271	95.1
History of rheumatoid arthritis		
Yes	64	22.5
No	221	77.5
Family history of breast Cancer		
Yes	24	8.4
No	261	91.6
Previous history of breast Cancer		
Yes	20	7.0
No	265	93.0
Previous history of breast surgery		
Yes	27	9.5
No	258	90.5
Breast implant		
Yes	1	0.4
No	284	99.6

Table 1: Sociodemographic parameters of respondents.

As detailed in Table 1 the ages of the study participants ranged from 23 years - 80 years. The mean, median and mode were 48.22 years, 48.00 years and 52 years respectively.

Sixteen (5.6%) of the women were nulliparous while two hundred and sixty-nine (94.4%) were parous.

Majority of the respondents; 154(54%) had previous breast examination while 131(46%) had no history of previous clinical breast examination.

Only 6(2.1%) subjects had previous history of hysterectomy while remaining 279(97.9%) had no history of hysterectomy.

Twenty (7%) had previous history of breast cancer while the remaining 265(93%) had no previous history of breast cancer. Few subjects: 24(8.4%) had family history of breast cancer and 261(91.6%) had no family history of breast cancer.

Variable	Frequency	Percentage
Mammographic density		
Almost entirely fatty	36	12.6
Scattered fibroglandular density	135	47.4
Heterogeneously dense	109	38.2
Extremely dense	5	1.8
BIRADS Classification		
Inconclusive **BIRAD 0**	37	13.0
Negative **B1**	158	55.4
Benign **B2**	59	20.7
Probably benign **B5**	21	7.4
Suspicious **B4**	8	2.8
Highly suggestive of malignancy **5**	2	0.7

Table 2: Mammographic density pattern and BIRADS classification of breast lesions in respondents.

As shown in Table 2, Most subjects; 135(47.4%) had scattered fibroglandular breast density pattern (BIRADS 2) while 109(38.2%) had heterogeneously dense breast density pattern (BIRADS 3).

In the final BIRADS category, 158(55.4%) had negative findings (Final BIRADS 1) while 59(20.7%) were benign findings (Final BIRADS 2).

Figure 1 shows the details of presenting symptoms of the subjects. The commonest presenting symptoms was pain. It accounted for 38 subjects (13.3%) on the right breast and 42 (14.7%) on the left breast.

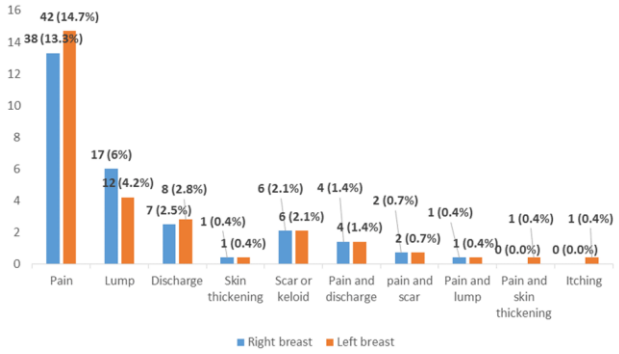

Figure 1: Presenting symptoms of respondents.

The breast density pattern and age group distribution are as detailed in Figure 2.

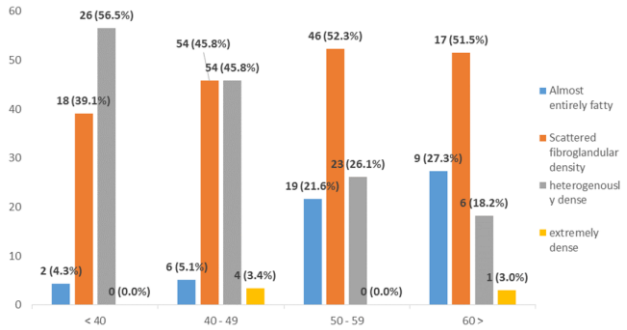

Figure 2: Breast density pattern and age group distribution.

BIRADS Category	AGR Group (years)				
	< 29	30 – 39	40 – 49	50 - 59	≥ 60
BIRADS 0	2 (66.7)	7 (16.3)	16 (13.6)	9 (10.2)	3 (9.1)
BIRADS 1	0 (0.0)	22 (51.2)	68 (57.6)	47 (53.4)	21 (63.6)
BIRADS 2	1 (33.3)	9 (20.9)	22 (18.6)	23 (26.1)	4 (12.1)
BIRADS 3	0 (0.0)	4 (9.3)	9 (7.6)	5 (3.7)	3 (9.1)
BIRADS 4	0 (0.0)	0 (0.0)	2 (1.7)	4 (4.5)	2 (6.1)
BIRADS 5	0 (0.0)	1 (2.3)	1 (0.8)	0 (0.0)	0 (0.0)

Table 3: Final BIRADS category by age.

Table 3 shows the details of final BIRADS category by age. As detailed in Table 4 there was no statistically significant association between BIRADS classification and selected socio-demographic/clinical variables.

Variable	BIRADS CATEGORY		Chi-square	p value
	1 & 2	3 & 4		
Age group (years)				
< 40	32 (88.9)	4 (11.1)	0.211	0.900
40 – 49	90 (89.1)	11 (10.9)		
≥ 50	95 (87.2)	14 (12.8)		
Age at first delivery (years)				
≤ 30	166 (87.4)	24 (12.6)	1.183	0.277
> 30	41 (93.2)	3 (6.8)		
Parity				
Nulliparous	11 (84.6)	2 (15.4)	0.171	0.680
Parous	206 (88.4)	27 (11.6)		
Post-menopausal status				
Yes	92 (87.6)	13 (12.4)	0.062	0.804
No	125 (88.7)	16 (11.3)		
Previous hysterectomy				
Yes	6 (100.0)	0 (0.0)	0.822	0.365
No	211 (87.9)	29 (12.1)		
Fertility drug use				
Yes	39 (88.6)	5 (11.4)	0.009	0.923
No	178 (88.1)	24 (11.9)		
Hormone therapy				
Yes	11 (100.0)	0 (0.0)	1.539	0.215
No	206 (87.7)	29 (12.3)		
History of rheumatoid arthritis				
Yes	44 (84.6)	8 (15.4)	0.820	0.365
No	173 (89.2)	21 (10.8)		
Previous history of breast cancer				
Yes	18 (100.0)	0 (0.0)	2.595	0.107
No	199 (87.3)	29 (12.7)		
Previous history of breast surgery				
Yes	22 (88.0)	3 (12.0)	0.001	0.972
No	195 (88.2)	26 (11.8)		

Table 4: Association between BIRADS classification and selected sociodemographic and clinical variables.

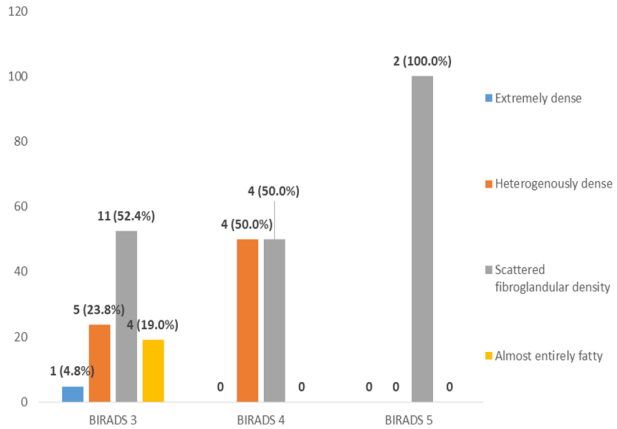

Figure 3: Breast density patterns in women with final BIRADS category [3-5].

DISCUSSION

In this study, the age of the subjects was not significantly associated with mammographic breast density pattern.

There was no steady decline in breast density pattern with increasing age as well. This finding is at variance with some previous studies [9-11].

Non-conformity of the findings of the three previous studies may be related to racial differences and sample size.

We also found that the premenopausal women in the study population had higher breast density pattern. This latter finding is consistent with some other studies carried by Gapstur et al and Boyd et al. [12,13].

It had been reported that menopause has a greater influence on decline of breast density pattern than age due to involution of the breast on attainment of menopause [14].

In this study even though age and menopausal status were not significantly associated with breast density pattern, the effect of menopause was higher than that of age on breast density pattern. The effects of menopause on characteristics of mammogram over the same period of time is greater than that of age.

The age at first term completed pregnancy was not significantly associated with mammographic density pattern with a p value of 0.277. This finding is consistent with some other previous reports [9,15,16].

The parity of the women reported in this study was not significantly associated with breast density pattern (p value = 0.680), however this finding contradicts some other previous studies [9,15].

The effect of parity is related to the involution of the breast following ceasation of the lactation period which leads to reduction in mammographic breast density with involution.

Less than half of the study population (40%) had mammographic breast densities of 3 and 4. This finding is higher than that of Galukande and Kinguli- Mativade in Uganda which reported that 25% of the study population had grades 3 and 4 mammographic breast densities [17].

The mean age of this latter study was 38.25 years which was actually lower than that of this study which was 48.2 years. Thus, one would have expected the Ugandan study to report higher levels of dense breast. The authors of the Ugandan study [17] suggested that the relatively low-density scores may be related to relatively low exposure to estrogen in spite of the relatively low age group. However, some other socio-demographic factors like the BMI (basal metabolic index) which was not accounted for in both studies may be responsible for the disparity in the findings of these two studies. The relatively low rate of extremely dense breast in this study is likely to make interpretation of mammographic films easier.

In a study carried out in Gwagwalada, Abuja, Nigeria, BIRADS 1 and 2 were the most prevalent mammographic breast density pattern accounting for 29.2% each respectively [18]. Parity was not statistically associated with mammographic breast density [18].

In another Nigerian study carried out by Muhammad et al. [19] in Sokoto it was reported that BIRADS 1 and 2 accounted for 41.6% respectively.

The finding of this latter study in respect of BIRADS 1 and 2 is higher than that of our study. This may be related to the difference in location, the relatively lower sample size (77) and the fact that the minimum age of the subjects recruited in the latter study was 40 years.

Akande HJ et al. [20] in a prospective study carried out in Ilorin, Nigeria reported that the commonest mammographic breast density pattern was BIRADS 2(43.9%) followed by BIRADS1(38.2%).

Another Nigerian study by Akinola et al. in Lagos reported that majority of the cases (51.3%) were classified as BIRADS 2 [21].

In a study carried out in Pakistan by Kulsoom et al. [22] it was reported that majority of the study population (56.9%) had dense breasts (BIRADS 3 and 4). Thus, there was reduction in the sensitivity of mammography in breast cancer detection in their population. In view of this, the authors of the latter study reported that mammography may be insufficient as a screening /diagnostic tool.

The difference in location between the study carried out in Pakistan and our study may be a contributory factor to the higher mammographic breast density pattern in the latter study.

Previous studies also demonstrated higher breast density in Asian women as opposed to non-Asian women [23,24].

This study had some limitations which included relatively low study population size and the fact that the study was carried out in a single tertiary centre in a semi-urban setting and this may not comprehensively represent the picture in Nigerian women.

The fact that body mass index was not assessed in this study is also a limitation of the study. Body mass index has effect on breast parenchymal pattern and breast density pattern.

CONCLUSION

The highest proportion of the study population had scattered fibroglandular breast density pattern.

Less than half of the study population had dense breast pattern.

Socio-demographic variables like age, parity and menopausal status were not significantly associated with the mammographic breast density pattern.

It is recommended that further similar studies with larger study population to clarify statistical significance of some associated factors like age, parity and menopausal status on mammographic breast density pattern should be conducted.

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