Outcome of Mammography Examination in Asymptomatic Women

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Abstract

Background: Early detection of breast cancer is important in reducing mortality, morbidity, and high socioeconomic burden associated with it. Mammography is currently the primary imaging modality used as a screening tool to detect early breast cancer in women experiencing no symptoms as they are most curable in the early stage with availability of breast conservative therapies. **Objective:** This study aimed at determining the mammographic breast density patterns and outcome in asymptomatic women who presented for mammographic examination in Abuja.

**Materials and Methods:** This descriptive cross-sectional study comprises of 113 asymptomatic women who presented for mammographic examination at the Radiology Department of University of Abuja Teaching Hospital, Gwagwalada from March 2015 to December 2018. Two basic views (craniocaudal and mediolateral views) of the breast were obtained using EXR-650 mammographic machine. **Results:** The mean age of study population was 40.72 ± 10.45 years with age range of 35 and 65 years. Base on mammographic breast density, breast imaging, reporting, and data system 1 and 2 were the most prevalent. There was a positive correlation between mammographic breast density and age of respondents. This relationship was statistically significant (Pearson correlation = 0.56, \( P = 0.000 \)). The mammographic outcome among asymptomatic women who had mammographic examination was negative in 69 (61.1%) women and positive in 44 (38.9%). The positive outcome noted in mammograms of women examined was: benign mass in 18 (15.9%) women; 9 (8.0%) had benign calcification; 7 (6.2%) showed architectural distortion; 5 (4.4%) was inconclusive; focal asymmetry in 3 (2.6%); and suspicious mass in 2 (1.8%). **Conclusion:** In this study, screening of women reveals various benign and malignant breast pathologies which necessitate early interventions.

**Keywords:** Abuja, asymptomatic women, breast density patterns, mammography, outcome

Résumé

**Contexte:** La détection précoce du cancer du sein est importante pour réduire la mortalité, la morbidité et le fardeau socioéconomique élevé qui en découlent. La mammographie est actuellement la principale modalité d’imagerie utilisée comme outil de dépistage pour détecter le cancer du sein précoce chez les femmes qui ne présentent aucun symptôme, car la maladie est facilement curable au stade précoce avec des thérapies qui favorisent la bonne conservation du sein. **Objectif:** Cette étude vise à déterminer les modèles de densités mammaires de mammographie et les résultats chez les femmes asymptomatiques qui se sont présentées pour la mammographie à Abuja. **Matériels et méthodes:** Cette étude transversale descriptive comprend 113 femmes asymptomatiques qui ont subi une mammographie au département Radiologie de l’hôpital universitaire d’Abuja, Gwagwalada de mars 2015 à décembre 2018. Deux type de vues de base (vues cranio-caudale et médio-latérale) ont été obtenues en utilisant deux appareils de mammographie de type EXR 650. **Résultats:** L’âge moyen de la population étudiée était de 40,72 ± 10,45 ans avec une tranche d’âge de 35 à 65 ans. Sur la base de la densité mammaire de la mammographie, l’image mammaire, les rapports et les systèmes de donnée 1 et 2 étaient les plus répandus. Il y avait une corrélation positive entre la densité mammaire de la mammographie et l’âge des répondantes. Cette relation était statistiquement significative (corrélation de Pearson = 0,56, \( P = 0.000 \)). Le résultat de la mammographie des femmes asymptomatiques était négatif chez 69 femmes (61,1%) et positif chez 44 (38,9%). Le résultat positif obtenu était comme suit: masse bénigne chez 18 femmes...

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How to cite this article: Kolade-Yunusa HO, Itanyi UD. Outcome of mammography examination in asymptomatic women. Ann Afr Med 2021;20:52-8.
Mammography is one of the imaging modalities that is primarily dedicated to breast diseases evaluation. It uses low energy photons of about 20-40KV to provide great contrast between the difference tissues that make up the breast. Its application in imaging of the breast has been characterized as diagnostic or for screening purposes.\(^1\)

Screening mammographic examination is for early detection of breast cancer in women who do not have any sign and symptoms for breast disease.\(^2,3\) It is particularly recommended for women above 40 years according to the American College of Radiologist (ACR) and those at risk which include those with positive family history of breast cancer and those who had radiotherapy to the chest wall.\(^2,3\)

With screening mammography, the high mortality and morbidity associated with breast cancers can be reduce by 30% as it can detect subtle architectural distortion and micro calcifications before lesion becomes palpable.\(^4\) With early detection, breast cancers are treatable, outcomes, and survival rates are much improved.

In Nigeria the incidence of breast cancer is on the rise with a reported incidence of 5%/year.\(^5\) This is quite worrisome. Although no well-structured organized program is available in Nigeria for women to undergo screening when compared to well-developed countries; however, there is increase in number of women who present for breast screening as a result of increased awareness of breast cancers over the years\(^6,7\) and the recent availability of mammographic facilities in some government hospitals.

Mammography is considered the gold standard for screening because of its high sensitivity and specificity, however the drawbacks of mammography as a screening tool and for diagnostic purposes depends solely on the density of the breast parenchyma, as dense breast obscure lesions and therefore reduce sensitivity of mammography.\(^5,7,8\) Other imaging modalities such as ultrasound and magnetic resonance imaging are important complimentary imaging modality in such situation.

With the increased awareness in breast cancer and following the acquisition of a mammographic machine in our facility, this study is being undertaken to add to the already existing data on screening mammographic in Nigeria. The study is aimed at determining the mammographic breast density pattern and outcome among asymptomatic women in Abuja.

**Conclusion:** Cette étude de dépistage chez les femmes révèle diverses pathologies mammaires bénignes et malignes qui nécessitent des interventions précoces.

**Mots-clés:** Abuja, femmes asymptomatiques, modèle de densité mammaire, mammographie, résultat

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**INTRODUCTION**

**Materials and Methods**

**Study design**

This was a descriptive cross-sectional study which spanned 33 months from March 2015 to December 2018.

**Study area**

This study was carried out at the Radiology department of University of Abuja teaching hospital, Gwagwalada, (F. C. T). The Hospital is located in Gwagwalada whose geographical coordinates are 8° 56’ 29” North and 7° 5’ 31” East. The hospital receives patients from neighboring states of Nassarawa, Kogi, Niger and Kaduna.

**Study population**

These comprise consecutive 113 asymptomatic women recruited at screening mammographic examination.

All patients had a standard craniocaudal and mediolateral oblique views of both breast using EXR-650 machine, Model = MC ARM (1), MP = CP (1) manufactured by Ecoray Company limited, Soeul Korea\(^2\) 2014. Additional views were obtained when necessary. Images of the breast were review by consultant radiologist (authors) and mammographic breast density patterns and overall findings were reported using the ACR Breast Imaging, Reporting and Data System descriptor (ACR-BIRADS). Mammographic breast density patterns were classified into four groups according to the BIRADS lexicon: BIRADS 1: Entirely fatty (glandular tissue <25%), BIRADS 2: Scattered fibro glandular tissue 25%–50% fibroglandular, BIRADS 3: Heterogeneously dense (51%–75% fibroglandular tissue), BIRADS 4: Extremely dense (75% fibroglandular tissue).

The mammographic outcomes were given final assessment using the BIRADS lexicon; BIRADS 0: Inconclusive, BIRADS 1: Normal, BIRADS 2: Benign, BIRADS 3: Probably benign BIRADS 4: Suspicious, BIRADS 5: Highly suspicious.

Information obtained from the participants include age, sex, occupation, tribe, parity, menarche, last menstrual period, family history of breast cancer, history of breast feeding, use of contraceptive, and any past history of breast surgery which were all entered into the excel sheet.

**Data analysis**

Data were collated and analyzed using SPSS 19.0 software 2019 (IBM, Chicago Illinois, USA). \(P < 0.05\) was considered as statistically significant. The results are presented in the form of tables and charts. Pearson correlation test was done to determine the relationship between variables.
Ethical consideration

Ethical approval was sought and received from University of Abuja Teaching Hospital ethics committee.

RESULTS

There were 113 asymptomatic subjects who presented for a mammographic examination during the study. The mean age of study population was 40.72 ± 10.45 years with age range of 35 and 65 years. Majority of the respondents were in 45–49 years of age group with 36 women representing 31.9%. However, eight women representing 7.1% had screening mammographic among 60–65 years of age group, as shown in Figure 1.

Majority of the respondents were of Hausa extraction and civil servants accounting 48 (42.5%) and 54 (47.8%), respectively. Furthermore, 48 (42.5%) of the respondents have greater than four children (multiparous) and 17 (15.0%) were nulliparous. Furthermore, 30 (26.5%) asymptomatic women recruited use contraceptive with Norplant the most used contraceptive accounting for 8.8% of the women. Majority of the women were premenopausal representing 64 (56.6%) and 49 (43.4%) were postmenopausal. Among the respondents, 25 (22.1%) had family history of breast cancer which constitute first-degree relatives and 88 (77.9%) without family history of cancer. In this study, 9 (8.0%) of the women had a past history of breast surgery. Most women 62 (54.1%) breast fed their children for 1 year [Table 1].

Based on the mammographic breast density pattern in the study, entirely fatty [BIRADS 1, Figure 2] was seen in 33 (29.2%) of women and was the predominate breast density among 45–49 years of age group representing 33.3%, closely followed by 50–55 years of age group accounting for 24.2%. Scattered fibroglandular tissue (BIRADS 2) was seen in 33 (29.2%) of women and was also the most observed mammographic pattern among 45–49 years of age group, but this pattern was not observed among 60–65 years of age group. BIRADS 1 and 2 were the most prevalent breast density demonstrated among the

| Table 1: Demography of asymptomatic women presenting for mammographic examination |
|---------------------------------|-----------------|
| Demography                      | Frequency (%)   |
| Occupation                      |                 |
| Civil servant                   | 54 (47.8)       |
| Homemaker                      | 35 (31.0)       |
| Artisan                        | 24 (21.2)       |
| Total                          | 113 (100)       |
| Parity                          |                 |
| Nulliparity                     | 17 (15.0)       |
| Parity 1                        | 20 (17.7)       |
| Parity 2-4                      | 28 (24.8)       |
| Parity 5 and above              | 48 (42.5)       |
| Total                          | 113 (100)       |
| Family planning                 |                 |
| Oral                           | 6 (5.3)         |
| Injectable                      | 7 (6.1)         |
| Norplant                       | 10 (8.8)        |
| IUCD                           | 7 (6.3)         |
| No                             | 83 (73.5)       |
| Total                          | 113 (100)       |
| FHXB                           |                 |
| Mother                         | 13 (11.5)       |
| Sister                         | 4 (3.5)         |
| Anut                           | 8 (7.1)         |
| No FHXB                        | 88 (77.9)       |
| Total                          | 113 (100)       |
| HXB/feeding                     |                 |
| Yes                            | 62 (54.9)       |
| No                             | 51 (45.1)       |
| Total                          | 113 (100)       |
| Tribe                          |                 |
| Hausa                          | 48 (42.5)       |
| Igbo                           | 40 (35.4)       |
| Yoruba                         | 25 (22.1)       |
| Total                          | 113 (100)       |
| PHXBS                          |                 |
| Yes                            | 104 (92.0)      |
| No                             | 9 (8.0)         |
| Total                          | 113 (100)       |

FHXB=Family history of breast cancer, HXB/feeding=History of breast feeding, PHXBS=Past history of breast surgery, IUCD=Intrauterine contraceptive device
asymptomatic women investigated. Extremely dense (BIRADS 4) was the least type of demonstrated mammographic breast density representing 19 (16.8%) of patterns seen [Table 2]. The demonstrated mammographic breast density pattern correlates positively with the documented age of the respondents and the relationship was statistically significant (Pearson correlation = 0.56, \( P = 0.000 \)) [Table 2].

The mammographic outcome among asymptomatic women who had mammographic examination was negative in 69 (61.1%) women and positive in 44 (38.9%). The differences observed between the positive and negative mammographic outcome was statistically significant \( P = 0.01 \). The positive findings noted in mammograms of asymptomatic women include benign mass in 18 (15.9%) women, 9 (8.0%) had benign calcification [Figure 3], 7 (6.2%) showed architectural distortion, 5 (4.4%) was inconclusive, focal asymmetry in 3 (2.6%), and suspicious mass in 2 (1.8%) [Table 3].

Using the BIRADS lexicon for mammographic outcomes, 5 (4.4%) were categorized as BIRADS 0, 69 (61.1%) were categorized as BIRADS 1, 27 (23.9%) as BIRADS 2, 10 (8.8%) as BIRADS 3, 1 (0.9%) BIRADS 4, and 1 (0.9%) BIRADS 5 [Figure 4]. Out of the seven women with mammographic finding of architectural distortion 4 (57.1%) have a past history of breast surgery. One of the women with a history of breast surgery, mammogram showed focal area of asymmetry.
Out of the 36 asymptomatic women in 45–49 years of age group, mammographic outcome was normal in 23 (69.9%), benign mass in 7 (19.4%) of women, 4 (11.1%) had benign calcification, 1 (2.8%) was inconclusive, and 1 (2.8%) asymptomatic woman investigated had architectural distortion on mammogram. From the nine asymptomatic women in 35–39 years of age group, 7 (77.8%) had normal mammographic outcome, 1 (11.1%) had benign mass, and 1 (11.1%) had architectural distortion. Among the eight women in 60–65 years’ age groups, 4 (50%) had normal mammographic findings, 1 (12.5%) had benign mass, 1 (12.5%) was inconclusive, 1 (12.5%) had focal asymmetry, and 1 (12.5%) had architectural distortion. The distribution of mammographic outcome among asymptomatic women and age was not statistically significant \( P = 0.56 \) Table 3. There was a positive association between the age of the asymptomatic women investigated and the mammographic outcome [Spearman’s correlation = 0.79, Table 3]. Most breast pathologies were noted in the right breast accounting for 29 (25.7%), 11 (9.7%) were seen in the left breast and 4 (3.5%) were in both breast. No known reason for predilection for the right breast.

From the 69 women with normal mammograms, 23 (33.3%) had entirely fatty breast density, 12 (17.3%) had scattered fibroglandular tissue, 18 (26.1%) had heterogeneous dense breast, and 16 (23.2%) had extremely dense breast. Of the 18 women with benign breast mass, 3 (16.7%) of the mass were found in an entirely fatty breast, 8 (44.4%) of the mass in scattered fibroglandular tissue 6 (33.3%) in heterogeneous breast, and 1 (5.6%) in extremely dense breast. The two malignant mass were found in women with fatty breast. The relationship between mammographic outcome and mammographic breast density was statistically significant \( P = 0.03 \) Table 4.

The relationship between mammographic outcome and some risk factors in the study was statistically significant. These include use of contraceptives \( (P = 0.002) \), family history of breast cancer \( (P = 0.02) \), and history of breast feeding for at most 1 year \( (P = 0.01) \). Whereas relationship of party, tribe, and occupation with mammographic outcome was not statistically significant \( (P = 0.47, P = 0.26, P = 0.38) \), respectively [Table 5].

**DISCUSSION**

Although there has not been any general guideline to determine the age at which women in Nigeria should present for screening mammography however the recommendation by the ACR for women above 40 years to have a screening mammogram also applies to our Nigerian women.[2,3] In this study, majority of the asymptomatic women who had a mammographic examination were in 45–49 years of age group accounting for 54.9%. This is similar to the study of Akhigbe et al. in Benin[9] but differ from the study of Obajimi et al. in Ibadan and Muhammad et al. in Sokoto whose predominate age was 40–44 years. These differences observed in the age of presenting for screening mammographic might be due to level of awareness toward healthy living.

Civil servants constituted the majority in our study. This is in variance from what was reported by Muhammad et al. in Sokoto where majority of women recruited in their study were unemployed. The difference observed might be due to the fact that the study area houses many government parastatals/ministries, departments and agencies (MDAs) which are largely occupied by civil servant who are more enlightened and well vested about health issues such as breast cancer. A large proportion of the women in the study were premenopausal representing 64 (56.6%). This is in agreement with study of Obajimi et al.[10] and Nggada et al.[10] and Owuchekwa and Alazigha.[10] The high proportion of premenopausal women may have accounted for the high incidence of benign breast pathology demonstrated in this study. The prevalence of use of contraceptive and family history of breast cancer was generally low among our study participants. Our finding is similar to what has been reported in some Nigerians[2,5] and African studies.[11]

Mammographic breast density can predict the risk of breast cancer in a women and it is referred to as the proportion of radiolucent fat to radiodense glandular tissue. BIRADS 1 (entirely fatty) and 2 (scattered fibroglandular tissue) were the prevalent mammographic breast density pattern in our study. This differ from what was reported by Akande et al.[7] and Akinola et al.[12] who report more of BIRADS 1 (entirely fatty) but in agreement with most other studies.[2,3,5] There are several factors which can affect mammographic breast density this include age, parity, body mass index, life style, and use of exogenous hormone.[13,14] This may be responsible for the

### Table 4: Mammographic breast density and outcome

| Findings            | Frequency (%) | Entirely fatty (%) | Scattered fibroglandular tissue (%) | Heterogeneous dense breast (%) | Extremely dense breast (%) | \( P \)  |
|---------------------|---------------|--------------------|------------------------------------|-------------------------------|---------------------------|--------|
| Normal              | 69 (61.1)     | 23 (69.7)          | 18 (54.5)                          | 12 (42.9)                     | 16 (84.2)                 | 0.032  |
| Benign mass         | 18 (15.9)     | 3 (9.1)            | 6 (18.2)                           | 8 (28.6)                      | 1 (5.3)                   |        |
| Suspicious mass     | 2 (1.8)       | 2 (6.1)            | 0 (0.0)                            | 0 (0.0)                       | 0 (0.0)                   |        |
| Benign calcification| 9 (8.0)       | 1 (3.0)            | 5 (15.2)                           | 2 (7.1)                       | 1 (5.3)                   |        |
| Inconclusive        | 5 (4.4)       | 1 (3.0)            | 0 (0.0)                            | 4 (14.3)                      | 0 (0.0)                   |        |
| Focal asymmetry     | 3 (2.7)       | 2 (6.1)            | 1 (3.0)                            | 0 (0.0)                       | 0 (0.0)                   |        |
| Architectural distortion | 7 (6.2)  | 1 (3.0)            | 3 (9.1)                            | 2 (7.1)                       | 1 (5.3)                   |        |
| Total               | 113 (100.0)   | 33 (100.0)         | 33 (100.0)                         | 28 (100.0)                    | 19 (100.0)                |        |
differences observed in the prevalent mammographic density in our study and other studies.\[^{7,12}\] BIRADS 3 and 4 breast density have low sensitivity to mammography as breast lesions and cancers can easily be obscured by the dense breast and as such are considered high risk breast densities.\[^{15,16}\] Three out five women with inconclusive mammographic reports had heterogeneous breast density, additional imaging with ultrasound was used to evaluate these women and two had breast cyst and the other a benign mass. There was a statistically significant relationship between the age of respondents and mammographic pattern of breast density. This was also reported in other studies.\[^{3,5,7}\]

The outcome of mammographic examination in asymptomatic women in this study was significantly normal (negative) among our study participants which is similar to reports from studies from other parts of the country.\[^{1,2,5,10}\]

In this study, 38.9% of the participants had positive mammographic findings with benign breast pathology constituting the majority 27 (23.9%). Our finding is in agreement with reports from Lagos,\[^{1}\] Sokoto,\[^{2}\] Benin,\[^{3}\] Ibadan,\[^{5}\] Benin,\[^{1}\] and Port-Harcourt.\[^{10}\] The benign pathologies demonstrated in the study include intramammary lymph nodes, breast cyst, axillary lymph nodes, fibroadenoma, and calcifications. Biopsy was recommended for six women (three women with findings of architectural distortion and two with focal asymmetry), three women eventually had the procedure (outcome was benign breast lesion for two and invasive ductal carcinoma for one of the women) and three did not return for the procedure.

Mammographic outcome may have a direct relationship with certain risk factors; however, there is paucity of data regarding the association of mammographic outcome and risk factors. In this study, the use of contraceptives, first-degree family of breast cancer, and history of breastfeeding had direct bearing on possible outcomes on mammographic. This was contrary to findings observed in a study in Sokoto by Muhammad et al.\[^{2}\]
The use of contraceptives, family history of breast cancer and not breastfeeding are documented known risk factors for breast cancer.

Parity as risk factor was not statistically significant in relation to outcome on mammographic which was consistent with study in Sokoto.[2] From the literature, nulliparity is a well-documented risk factor for breast cancer. Furthermore, tribe and occupation were also not statistically significant with mammographic outcome and this was consistent with study in Sokoto[2] with Hausas the major tribe in both studies.

**Limitation**

This is basically a hospital-based research but community screening examination will afford a larger sample size.

**Conclusion**

Benign breast pathologies were essentially the major mammographic outcome among asymptomatic women presenting for screening, although two women had suspicious mass which was confirm to be cancer. BIRADS 1 and 2 breast density were prevalent among the study population. Women should be encouraged to have a screening mammographic examination.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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