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FACTORS INFLUENCING MAMMOGRAPHIC DENSITY AMONG WOMEN ATTENDING AL-ELWIYAH MATERNITY HOSPITAL IN BAGHDAD

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ABSTRACT

Introduction: Mammography is an important diagnostic imaging and screening modality for the early detection of breast cancer. Increased mammographic breast density (MBD) is not only a risk factor for breast cancer diagnosis, but it results in reducing the sensitivity and specificity of mammography. Understanding influencing factors on MBD aids in targeting women who require more attention in breast cancer screening programs and even in trying to reach direct causation in breast density and hence breast cancer. **Objectives:** Examine factors influencing breast density in mammography. **Methods:** Between March and September 2022, record files of 150 women over 35 years of age who attended woman's health center in Al-Elwiya Maternity Teaching Hospital in Baghdad, Iraq were randomly chosen. According to the results of mammography, we divided cases into two groups. Group I type A+B (Non- dense,), Group II type C+D (dense,), by using BI-RADS classification for breast density, 2013. The data of the cases was analyzed retrospectively. **Results:** Six significant factors were found to be associated with mammographic density: age (OR: 1.5; 95% CI: (0.13-16.9), Body Mass index (BMI) (OR: 0.68; 95% CI: 0.29-1.55), parity (OR: 1.5; 95% CI: 0.13-16.9), age at menarche (OR: 0.74; 95% CI: 0.04-12.0), diagnosis with malignancy (OR: 0.733; 95% CI: 0.24-2.18), diagnosis with benign disease (OR: 0.484; 95% CI: 0.18-1.29) and the duration of breastfeeding in months (OR: 0.253; 95% CI: 0.025-2.49). **Conclusion:** Increased BMI, age in years and parity result in reduction of MBD. Also, BMI and the age at menarche were found to be independent risk factors for reducing MBD. There was an inverse relation between the duration of breastfeeding and breast density.

KEYWORDS: mammography, breast density, breast cancer, risk factors.

INTRODUCTION

Mammography is an important diagnostic imaging and screening modality for the early detection of breast cancer.[1] Mammographic breast density (MBD) refers to the relative amount of dense tissue in an entire breast. Dense tissue comprises of connective and epithelial tissue including glandular parenchyma and hinders X-Ray transmission and therefore, appears dense/white on mammography. Fatty parenchyma allows unhindered X-ray transmission and hence appears darker/lucent on a mammogram. Dense breast tissue results in masking of breast cancer and hence the mammographic sensitivity is reduced with increasing MBD.[2] Breast density is an important risk factor for breast cancer. Increased density is not only a risk factor for breast cancer, but it results in reducing the sensitivity and specificity of mammography.[3,4] Breast cancer can be defined as any type of abnormal growth of the breast cells. Histologically, the most common subtypes of breast cancer are ductal and lobular carcinoma.[5] Breast density on mammography is determined relatively with measured breast fat and fibroglandular tissue and also in dense breast tissue breast cancer risk is increasing 4 to 6 times more than in non-dense breast tissue. Breast density is influenced by many factors such as age and menopause.[6] Breast density shows geographic and ethnic differences.[7] In addition, breast density decreased

as BMI rose regardless of age. However, the risk of breast cancer decreases as BMI increases in premenopausal women, but increases as BMI increases in postmenopausal women.[8] **Aim of the study:** Determining factors affecting breast density in mammography.

MATERIAL AND METHODS

The source population of this study is from record files of women attended woman's health center in Al-Elwiya Maternity Teaching Hospital in Baghdad Iraq, between March and September 2022. 150 records of women aged more than 35 years were randomly chosen. According to the results of mammography, cases were divided into two groups; Group I type A+B which included (fatty, scattered fibroglandular) or (Non- dense,), Group II type C+D which included (heterogeneously dense, dense) or (dense,), by using BI-RADS classification for breast density, 2013. All subjects were taken from records in hospital that included information on age, Weight (kg), height (cm), BMI (kg/m²), Parity, Age at Menarche (year), Duration of breast feeding, Final Diagnosis and other information.

Data management and statistical analysis: A total of 150 records were the subjects of this study. IBM SPSS version 26 was used for this study statistical analysis. Participant characteristics were presented as mean, standard deviation, percentages, and tables. Fisher's exact and chi square tests were used to test the association between different study parameters ($p < 0.05$).

RESULTS

The mean age of the study participants was 54 years (SD 18.2). (16 %) women were fatty breast tissue, (41%) were scattered fibroglandular breast tissue. (29%) of the women had heterogeneously breast tissue density, and (14%) of them were dense of breast tissue. Figure 1 shows that high MBD (heterogeneously dense and dense) category accounted for 43% of all participants.

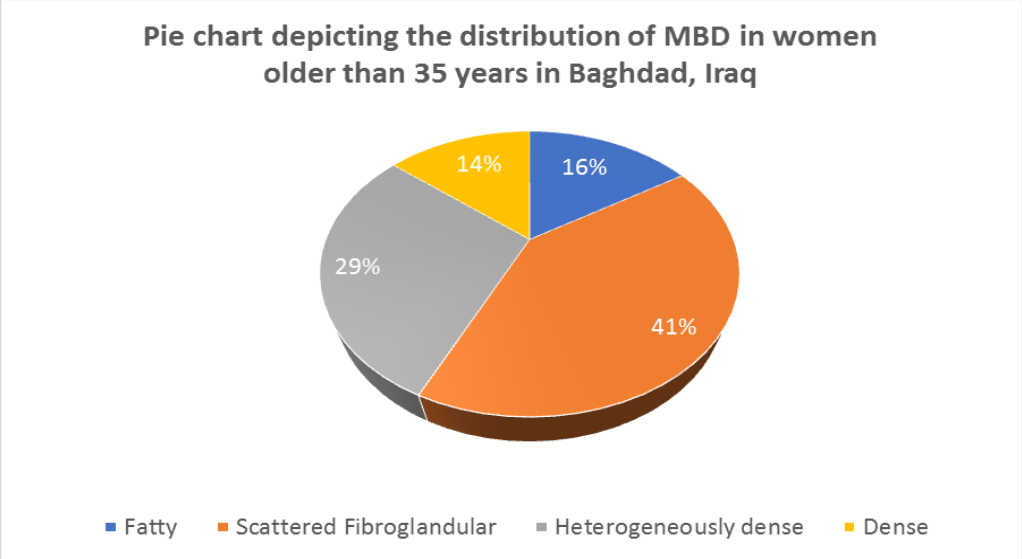

Fig. 1: shows distribution of study participants by mammographic breast density among women in study. (n=150).

Table 1 shows that there were significant differences in age between the dense and non-dense breasts women. Regarding weight, in the 70-79 kg category, 45 (52.3%) and 31 (48.4%) were found to have non-dense and dense breasts respectively. Both percentages decreased as the weight increased. In the height category (160-169 cm), 45 (52.3%) and 33 (51.5%) were in the in the non-dense and dense breasts respectively. Both percentages decreased as the height decreased. BMI (kg/m²) shows difference in the category of (25-29.9) where 64 (74.42%) and 37 (57.81%) were in the non-dense and dense groups respectively. Parity category of 3 deliveries shows greatest difference in numbers between the two groups. 31(67.4%) of those diagnosed with a benign lesion were in the non-dense group which was obviously greater percentage than the dense group. As such 34 (39.53%) of those taking combined oral contraceptive pills were in the non-dense feature, while the percentage of those who did not take was higher, as shown in (Table 1). Also, the percentage of women taking these pills in the dense feature was 18 (28.12%), meaning that the percentage decreased significantly, and this indicates that pills do not affect breast density. The breast density increases with the short duration of breastfeeding in months, where the highest percentage of breast density was (17.18%) in 11 participants, where the duration of breastfeeding was <1 month, while we see in the results of mammography in 1 participant, and the duration of breastfeeding ≤ 72 months, the percentage of breastfeeding was (1.56%) in breast adenoma on mammographic examination as shown in (Table 1).

Table (1) Characteristics of study participants by mammographic breast density among women in Baghdad, Iraq. (n=150)

Variable	Categories	Mammographic Breast Density (MBD)				P- Value
		Non - dense		Dense		
		Count	%	Count	%	
Age(years)	36 - 39	14	58.3	10	41.7	0.905
	40 – 49	37	59.7	25	40.4	
	50 – 59	24	57.2	18	42.8	
	60 – 69	9	47.4	10	52.6	
	70 - 73	2	66.7	1	33.3	
Weight (Kg)	53 – 59	3	3.4	3	14	0.103
	60 – 69	19	22	17	26.5	
	70 – 79	45	52.3	31	48.4	
	80 – 89	19	22	8	12.5	
	90 – 99	0	0	3	14	
	100 - 102	0	0	2	3.1	
Height (cm)	144 - 149	2	2.3	0	0	0.868
	150 - 159	39	45.3	31	36	
	160 - 169	45	52.3	33	51.5	
BMI* (kg/m²)						0.711
Normal	18.5 - 24.0	1	1.16	3	4.68	
Overweight	25 - 29.9	64	74.42	37	57.81	
Obese	≥30	18	20.93	19	29.69	
Parity	0	13	15.1	4	6.25	0.065
	1	4	4.6	1	1.56	
	2	17	19.7	18	28.1	
	3	27	31.3	11	17.1	
	4	16	18.6	16	25	
	5	4	4.6	10	15.6	
	6	3	3.4	3	4.6	
	7	2	2.3	1	1.5	
Age at Menarche (year)	10	3	3.48	2	3.12	0.983
	11	33	38.3	27	42.1	
	12	30	34.8	22	34.3	
	13	19	22	12	18.7	
	14	1	1.16	1	1.56	
History of Pills intake**	No	52	60.46	46	71.87	0.167
	Yes	34	39.53	18	28.12	
Total duration of Breast Feeding in months	≤16	57	66.28	45	70.31	0.854
	17 - 32	19	22.09	14	21.87	
	33 - 48	7	8.14	4	4.65	
	49 - 72	3	3.48	1	1.56	
Diagnosis	Malignant	15	57.7	11	42.3	0.057
	Benign	31	67.4	15	32.6	0.233
	Normal	13	13.25	13	13.25	1.00

*= Body Mass Index, **= Oral Combined Contraceptive Pills, P≤0.05

(Table 2) demonstrates the association between different factors and MBD using odds ratios (OR) and 95% confidence intervals (CI). It shows that women with dense and heterogeneously dense breasts were of a younger age group compared to fatty and fibroglandular breasts women and had higher benign breast diseases (BBD). An inverse relationship between BMI, parity, age at menarche, the duration of breastfeeding with MBD was also observed. Finally, there were six significant factors found to be associated with mammographic density: age (OR: 1.5; 95% CI: (0.13-16.9), BMI (OR: 0.68; 95% CI: 0.29-1.55), parity (OR: 1.5; 95% CI: 0.13-16.9), age at menarche (OR: 0.74; 95% CI: 0.04-12.0), diagnosis with malignancy is (OR: 0.733; 95% CI: 0.24-2.18), benign pathology (OR: 0.484; 95% CI: 0.18-1.29) and the duration of breastfeeding in months (OR: 0.253; 95% CI: 0.025-2.49).

Table (2) Univariable logistic regression of mammographic breast density of women who attended woman's health center in Al-Elwiyah Hospital.			
Variables	**OR**	**95% (CI)**	**P- value**
Age (year)	1.5	(0.13-16.9)	0.905
Weight (kg)	1.8	(0.73-4.43)	0.103
Height (cm)	1	(0.52-1.92)	0.868
Body mass index (kg/m²)	0.68	(0.29-1.55)	0.711
Parity	1.5	(0.13-16.9)	0.065
Age at Menarche (year)	0.74	(0.04-12.0)	0.983
History of oral contraceptive pills intake	0.6	(0.299-1.2)	0.167
Total Duration of Breast feeding in months	0.253	(0.025-2.49)	0.243
Final Diagnosis Malignant Benign	 0.733 0.484	 (0.24-2.18) (0.18-1.29)	 0.057 0.233
OR= (Odds Ratio), CI= (Confidence Interval), P value ≤0.05.			

DISCUSSION

Breast cancer risk was significantly affected by increased breast density on mammography. The meta-analysis of 42 studies, it has been found that the risk of breast cancer is 4.64 times greater in women with increased MBD than in women with low density. The evaluation of breast density is relatively easy on mammography and can be used as an important parameter for early intervention and prevention of breast cancer.[8] Therefore, knowledge of the risk factors that may lead to increased MBD and evaluation of women with these risk factors will be important in the early detection of breast cancer. At univariate analysis, Breast density decreases with increasing age.[10] This which our study agrees with. The effect of the age on MBD was not clearly defined.[10,11] MBD decreased as the women got older, especially around the menopausal age.[12] About 66.7% of the non-dense group were postmenopausal women, and the dense group made up 40.4% of pre-menopausal women in this study (Table 1). In the 70-79 kg weight category, 45 (52.3%) and 31 (48.4%) were found to have non-dense and dense breasts respectively. Percentages of weight categories in both non-dense and dense groups decreased as the weight increased which contradicts other study that finds that in both premenopausal and postmenopausal women, body weight is inversely associated with the percentage of mammographic density.[13] In our study, percentages of height categories in the non-dense and dense groups decreased as the height decreased. In another study, increased height was also positively associated with mammographic density, particularly dense area. These results suggest a complex relationship between growth and development, mammographic density and breast cancer risk.[14] BMI (kg/m²) showed a significant difference in the category of (25-29.9) where (74.42%) and (57.81%) were in the non-dense and dense groups respectively. As such, researchers found that women with a higher BMI were less likely to present with dense breasts. Many studies found like this out coming.[8,15,16,17,18] On the other hand, lack of parity was a significant risk factor for a dense breast among women, as found in the previous studies.[15,19] Lobular involution had been observed to be lower in parous women, reducing the degree of mammographic density, especially in pre-menopausal women.[20,21,22] In one of the largest international studies to date, later age at menarche was positively associated with mammographic density.[14] Relating with history of combined oral contraceptive pills intake in (Table 1), it is shown that number of non-dense breast women 34 (53.78%) was more than number of dense women 18 (28.12%), so we can conclude that there was no association between pills intake and MBD, it was with (OR0.60: 95%CI (0.299-1.2) with p-value 0.167, at significant scale p≤0.05) as shown in table (2) and this agrees with, Yaghjyan et al. The evidence regarding the possible association between pills use and MBD remains very limited[23], and our findings of no association between pills intake and MBD are consistent with those from previous studies. A cross-sectional study of 366 cancer-free women from United Arab Emirates by Albeshan et al. found no association between ever use of pills and MBD defined using American College of Radiology's Breast Density classification system (BI-RADS) (OR:1.25; 95% CI 0.50-3.16) but the odds of pills use for ≥3 years were 511% higher among women with dense breasts compared to those with low density (OR: 6.11; 95% CI 1.41-26.57).[23,24] Regarding the duration of breastfeeding we have found that it is inversely related to MBD as shown in table (2) and this agrees with study presented by Yaghjyan et al[25] in which he concluded that women with greater number of children and younger age at first child's birth have more favorable MBD patterns that could explain subsequent breast cancer risk reduction. In our study, a positive association of breastfeeding duration with both dense and non-dense breasts in premenopausal women has been found, while there was no such association in postmenopausal women; suggesting that the effect of breastfeeding on breast tissue is likely temporary. In a previous study by Prebil et al., duration of breastfeeding was positively associated with fibro-glandular volume among 2440 parous women (OR for square root transformed fibro-glandular volume= 0.01, 95% CI 0.003-0.02).[26]

CONCLUSION

Increased BMI, age in years, parity, older age at menarche, duration of breastfeeding in months and diagnosis with malignant or benign breast pathologies were found to be independent risk factors for reducing MBD. Understanding influencing factors on MBD aids in targeting women who require more attention in breast cancer screening programs and even in trying to reach direct causation in breast density and hence breast cancer. Therefore, it is recommended to conduct extensive studies to certify the known and identify other possible factors to lead an individualized assessment for each category of breast density.

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