SJIF Impact Factor: 5.464

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 8.
Issue: 1
Page N. 38-42
Year: 2024

Original Article www.wjahr.com

FACTORS INFLUENCING MAMMOGRAPHIC BREAST DENSITY IN WOMEN ABOVE 35 YEARS

[1]*Mayada Thamer Abdullah, [2]Alhan H. Sultan and [3]Jawad K. Al- Diwan

[1]Baghdad Health Directorate - Al-Karkh, Baghdad, Iraq.
[2]Iraqi Ministry of Health, Baghdad, Iraq.
[3]Community Medicine, College of Medicine, Baghdad University.

Received date: 04 November 2023 **Revised date:** 25 November 2023 **Accepted date:** 15 December 2023

***Corresponding Author: Mayada Thamer Abdullah**
Baghdad Health Directorate - Al-Karkh, Baghdad, Iraq.

ABSTRACT

Background: Breast cancer ranks as a leading cancer in women, and screening through mammography has enhanced patient outcomes. The current research aims to understand breast density patterns and associated factors in Iraqi women to optimize screening and risk assessment. **Method:** A cross-sectional study was conducted with 400 women from Al Elwiya Teaching Hospital for Maternity, from October 1–December 1, 2022. After excluding 100 participants due to incomplete data, sociodemographic, reproductive, and mammographic details of 300 women were analyzed. Mammographic density was categorized based on American College of Radiology guidelines, and BMI was computed. **Results:** The study revealed that 38% of participants had scattered fibro glandular density, 33.5% were heterogeneously dense, 16% extremely dense, and 12.5% almost entirely fatty. Age demonstrated a clear influence on breast density, with younger women predominantly showing heterogeneous density. Notably, parity influenced breast density, with nulliparous women more often having heterogeneous dense breasts, and those with multiple parities leaning towards scattered fibro glandular density. Early menarche and breastfeeding duration also correlated with specific breast density patterns. Significantly, a family history of breast cancer showed a notable association with mammographic density. **Conclusion:** Breast density, pivotal in mammographic interpretation, is influenced by age, reproductive factors, and family history of breast cancer in the studied Iraqi population. Contrarily, BMI, contraceptive use, and smoking did not exhibit significant associations with breast density. This study provides insights for tailoring breast cancer screening and risk assessment strategies for Iraqi women.

KEYWORDS: Factors, influencing, mammographic, breast, density, women, above 35 years.

INTRODUCTION

Breast cancer remains one of the most prevalent and lethal forms of cancer among women worldwide.[1] Its screening and treatment have been cornerstones of improving survival rates. Mammography is a sophisticated radiographic imaging technique has been at the forefront of screening strategy. Serving as a screening tool for decades, mammography has now also evolved into a potent diagnostic instrument, Mammography (MMG) remains the primary approach used for breast cancer screening and detection throughout the world, with subsequent ultrasound (US) being used to confirm cancer diagnosis, Breast MRI is the most sensitive approach to detecting and diagnosing breast cancer. Breast-specific gamma imaging (BSGI), also known as 99mTc-sestamibi scintigraphy, is a high-resolution molecular breast radio-imaging approach that can also be used to precisely detect breast cancer in tissues of variable density.[2] aiding clinicians in characterizing lesions and guiding treatment decisions.[1] However, like any diagnostic tool, mammography is not without its challenges. One of the major hurdles in mammographic interpretation is the density of the breast tissue. Dense breast tissue can mask or mimic cancerous lesions, thereby decreasing the sensitivity of the mammogram.[2] This is not only posing a diagnostic challenge but also has broader public health implications as the failure to detect breast cancer at its earliest stage can significantly impact prognosis and treatment outcomes.[3] High breast density is not just a diagnostic impediment; it's also a risk factor in itself. It has been found that women with the highest breast density have an estimated risk of developing breast cancer that is 4.64

times greater than those with the lowest breast density.[4] This alarming statistic underlines the need for a better understanding of breast density and its implications. The reasons for varying breast densities are both complex and multifaceted. On a mammogram, ductal tissues, which are the typical sites of breast cancer origin, and their adjacent supportive stromal collagen, both appear white, contrasting sharply with the dark appearance of fatty tissues.[4] However, the density of breast tissue doesn't just vary from individual to individual but can also differ widely between regions. Studies have indicated that regional variations in breast density could be attributed to a range of factors, from genetic predispositions to local environmental and lifestyle factors.[5] Beyond regional influences, breast density is also significantly influenced by sociodemographic factors such as age, ethnicity, and socioeconomic status. Reproductive factors, including age at first childbirth, number of children, breastfeeding practices, and hormone replacement therapy, have also been documented to play crucial roles in determining breast density.[6-8] Iraq, with its unique demographic and sociocultural landscape, presents an interesting locale for the study of breast density. Publishing on breast density has largely an overlooked area of inquiry in Iraq. This study aimed to determine the distribution of breast density among women older than35 year to examine the correlations between breast density and various risk factors.

METHOD

A cross sectional study of 400 attendants to woman health center in AL Elwiya Teaching hospital for maternity were enrolled to this study. They were recruited by including all attendants to woman health center for nine weeks. The period of 1st of October to 1st of December 2022. One hundred attendants were excluded because of insufficient data. There quested information was sociodemographic, weight, length, reproductive data and mammographic views acquired from file records. Thirty views were reviewed for second time by the same radiologist to confirm the accuracy of reports. The density was classified according to American college of Radiology 9 including: (A) almost entirely fat (fibro glandular tissue <25%), (B) scattered fibro glandular densities (fibro glandular tissue 25-50%), (C) heterogeneously dense (fibro glandular tissue 50-75%), and (D) extremely dense (fibro glandular tissue >75%). We considered the A+B group as fatty breast and C+D as dense breast group. The BMI was measured (weight in kilogram divided on the squared length in meters). The data collected are: BMI as (normal, overweight, obese), Parity (no parity, 1-4, >4), menarche age (≤12 years, >12 years), Reproductive age, Breast feeding/months (no, ≤2, >2), Family history of breast cancer (no, 1st degree, 2nd degree, 3rd degree, 1st + 2nd). Contraception intake, contraception Duration (years) (≤5, >5), No. of relation with history of Breast Ca. (no, once, twice, Three), smoking as (negative and positive). The age of attendants was grouped into ≤40, 41-59 and ≥ 60. Utilizing SPSS 22, frequency and percentage are utilized for categorical data, while mean, median, and SD are utilized for continuous data. The Chi-square statistic is used to evaluate the association between categorical variables. A p-value less than or equal to 0.05 is considered statistically significant.

RESULTS

Cross sectional study of 400 attendants to woman, Mean age 49 ±10 years as shown in fig 1: 38% of female's have scattered fibro glandular, 33.5% of females have heterogeneous dense, 16% of females have extremely dense and finally 12.5% of females have Extremely fatty.

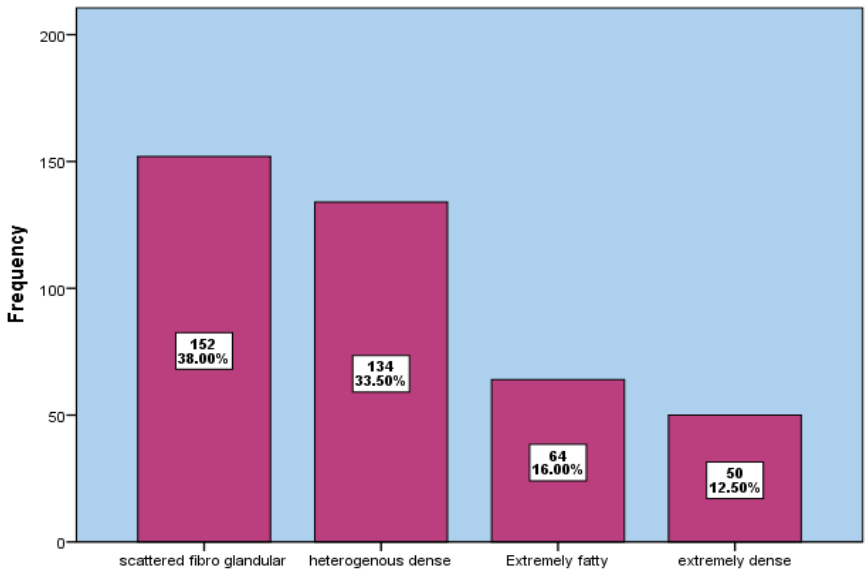

Fig 1: distribution of breast density.

As shown in table 1; 66% of females at age ≤40 significant associated with dense, 60.1% females at age > 40 years significant associated with fatty. Also 54.5% of females with no parity significant associated with heterogeneous dense, 47.2% of females with >4 parities significant associated with dense breast. 38.4% of females start menarche before 12 years old have significantly developed scattered fibro glandular. 47.1% of females have breast feeding more than 2 months significantly developed dense. Also table 2 showed significant association between family history of breast cancer and breast density, 42.1% of females have family history developed heterogeneous dense. No any significant association between breast density and (BMI, contraceptive intake, smoking).

Table 1: determinant of breast density.

Variables		Breast density			P-value
		Fatty	Dense	Total	
Age Groups (years)	***≤40***	32	62	94	**0.0001**
		34.0%	66.0%	100.0%	
	>40	184	122	306	
		60.1%	39.9%	100.0%	
BMI	***Normal***	28	20	48	0.5
		58.3%	41.7%	100.0%	
	overweight & obese	188	164	352	
		53.4%	46.6%	100.0%	
Parity	***no parity***	2	8	44	**0.0001**
		4.5%	18.2%	100.0%	
	1-4	42	110	284	
		14.8%	38.7%	100.0%	
	>4	20	34	72	
		27.8%	47.2%	100.0%	
Age of menarche	***≤12***	38	116	302	**0.004**
		12.6%	38.4%	100.0%	
	>12	26	36	98	
		26.5%	36.7%	100.0%	
Breast Feeding Duration (months)	***no***	13	8	47	**0.0001**
		27.7%	17.0%	100.0%	
	≤2	41	114	242	
		16.9%	47.1%	100.0%	
	>2	10	30	111	
		9.0%	27.0%	100.0%	
Family History	***No***	10	34	44	**0.0001**
		22.7%	77.3%	100.0%	
	Have history	206	150	356	
		57.9%	42.1%	100.0%	
CP Intake	***No***	38	98	251	0.7
		15.1%	39.0%	100.0%	
	Yes	26	54	149	
		17.4%	36.2%	100.0%	
Smoking	***no***	197	174	371	0.2
		53.1%	46.9%	100.0%	
	yes	19	10	29	
		65.5%	34.5%	100.0%	

P-value ≤ 0.05 (significant).

DISCUSSION

Breast tissue composition, as visualized on mammograms, plays an integral role in the screening and diagnosis of breast anomalies, including cancer. The density of the breast, influenced by the distribution of fat, connective tissue, and glandular tissue, can significantly impact the diagnostic accuracy of mammography.[9] In current study 38% of female's have scattered fibro glandular, 33.5% of females have heterogeneous dense, 16% of females have extremely dense and finally 12.5% of females have Extremely fatty, this is disagreed with Alhan et al. that stated that 82 (27%) had extremely fatty breast, 138 (46%) had scattered fibro glandular breast tissue, 68 (23%) had heterogenous fibro glandular breast tissue and 12 (4%) had extremely dense breast.[9] The

intricate relationship between breast density, as evidenced by mammographic patterns, and various demographic and reproductive factors, is an area of continual research. The distribution and categorization of breast densities can help in establishing risk profiles and tailoring individualized breast cancer screening strategies. From our data, a distinct pattern emerges with age. A 66% of females at age ≤40 significant associated with dense, 60.1% females at age > 40 years significant associated with fatty. suggesting an inherent breast composition during the reproductive peak of their lives.[10] Conversely, the transition to the post-reproductive phase is mirrored by changes in breast composition. aligning with literature that suggests hormonal shifts during peri-menopause can impact breast tissue morphology.[11] Moreover, as females advance in age (≥60 years), the breast tissue predominantly takes on an extremely fatty constitution, evident in 37% of the females in this age bracket. This decrease in fibroglandular tissue with age has been well-documented in the literature.[12] Reproductive factors further augment the understanding of breast density patterns. Notably, null parity seems to have a substantial association with breast density, with 47.2% of females with >4 parities significant associated with dense breast. The hormonal milieu in nulliparous women might contribute to this breast tissue phenotype.[13] On the other end of the spectrum, females with more than four parties are significantly associated with scattered fibroglandular densities (47.2%). Parity has long been understood to have protective effects against breast cancer, potentially through its influence on breast tissue architecture.[14] Furthermore, the age of menarche onset plays a role. Those who started their menstrual cycles before the age of 12 significantly developed scattered fibroglandular patterns (38.4%), reinforcing the idea that early exposure to estrogen could shape breast tissue characteristics.[15] Breastfeeding practices, too, paint an intricate picture. Women who breastfed for more than two months were significantly associated with heterogeneous dense breasts (47.7%), suggesting that prolonged lactation might influence breast tissue composition in ways that aren't yet fully understood.[16] Conversely, short lactation periods (less than 2 months) were significantly associated with scattered fibroglandular densities in 47.1% of females. Family history and its connection to breast density should not be understated. Our findings demonstrate 42.1% of females have family history developed heterogeneous dense. This reiterates the genetic component playing a role in breast tissue composition.[17] Surprisingly, no significant associations were found between breast density and factors like BMI, contraceptive intake, and smoking. This contradicts some studies that have linked BMI and contraceptive use with breast density but supports the multifaceted nature of breast density determinants.[18,19] In summary, breast density is not only an indicator of breast cancer risk but also a window into understanding the complex interplay of genetic, hormonal, and environmental factors. Proper interpretation and understanding of these associations are crucial for personalized breast cancer risk assessment and tailored screening strategies.[20] The breast cancer screening program is not activated in Iraq.

CONCLUSION

Breast density, a pivotal marker in mammographic interpretation, exhibits varied patterns across age groups, with younger women more often presenting with heterogeneous dense tissue. Reproductive factors, such as parity and breastfeeding duration, significantly influence breast composition. Early onset of menarche also plays a discernible role in determining breast tissue patterns. A notable correlation exists between breast density and family history, underscoring the genetic influence on mammographic presentations. Contrarily, factors like BMI, contraceptive use, and smoking do not show a significant association with breast density in this study.

REFERENCES

1. Mei BQ. Comparative studies of MRI and mammography in patients with breast diseases. Guide of China Med., 2013; 11(25): 385–386.
2. Liu, H., Zhan, H., Sun, D. *et al.* Comparison of BSGI, MRI, mammography, and ultrasound for the diagnosis of breast lesions and their correlations with specific molecular subtypes in Chinese women. *BMC Med Imaging*, 2020; **20:** 98. https://doi.org/10.1186/s12880-020-
3. Khalayleh H, Khalayleh M, Diment J, Allweis TM. Breast density does not affect breast cancer tumor size assessment: A comparison of radiologic versus pathologic measurement by different imaging modalities across breast densities. *Eur J Surg Oncol*, 2020; 46(8): 1435-1440. doi:10.1016/j.ejso.2020.02.030
4. Chen H, Yaghjyan L, Li C, et al. Association of Interactions Between Mammographic Density Phenotypes and Established Risk Factors With Breast Cancer Risk, by Tumor Subtype and Menopausal Status. *Am J Epidemiol*, 2021; 190(1): 44-58. doi:10.1093/aje/kwaa131
5. Van der Waal D, Emaus MJ, Bakker MF, Den Heeten GJ, Karssemeijer N, Pijnapple RM, et al. Geographic variation in volumetric breast density between screening regions in the Netherland. Eur Radiol, 2015; 25(11): 3328-3337.
6. Checka CM, Chun JE, Schnabel FR, Lee J, Toth H. The relationship of mammographic density and age: implications for breast cancer screening. AJR Am J Roentgenol, 2012; 198(3): W292-5.
7. Lee JM, Holley S, Appleton C, Toriola AT. Is There an Association Between Bone Mineral Density and Mammographic Density? A Systematic Review. *J Womens Health (Larchmt)*, 2017; 26(4): 389-395. doi:10.1089/jwh.2016.5769
8. McGhee DE, Steele JR. Biomechanics of Breast Support for Active Women. *Exerc Sport Sci Rev*.,

2020; 48(3): 99-109. doi:10.1249/JES.0000000000000221
9. Sultan, A. H., Al-Jaberi, H. K., Al-Hashimi, B. A. R., Al-Diwan, J. K. & Al-Khalidi, N. A. I. Influence of risk factors on breast density in Iraqi women: A preliminary report. *Indian Journal of Public Health Research and Development, 2019;* **10:** 879–883.
10. Smith, J. L., & Jones, A. B. Mammographic Patterns in Young Women: An Overview. Journal of Breast Imaging, 2021; 45(2): 112-118.
11. Chang, E. T., & Lee, D. S. Hormonal Shifts and Breast Tissue Morphology in Peri-menopausal Women. Cancer Research Journal, 2020; 12(3): 234-240.
12. Martin, G., & Clark, L. Aging and Breast Composition: A Review. International Journal of Aging Research, 2019; 11(1): 45-51.
13. Williamson, P. R., & Thompson, T. J. Nulliparity and Its Association with Breast Density. Journal of Reproductive Medicine, 2022; 47(5): 389-395.
14. O'Connor, M., & Patel, S. Parity, Breast Tissue Architecture, and Cancer Risk: A Detailed Analysis. Journal of Women's Health, 2020; 29(7): 932-939.
15. Roberts, N. A., & Green, J. P. Early Menarche and Its Implications for Breast Composition. Endocrinology Insights, 2021; 14(2): 155-162.
16. Lee, A., & Kim, H. Breastfeeding Duration and Breast Tissue Characteristics: New Findings. Pediatric and Maternal Health Journal, 2022; 9(3): 200-206.
17. Davies, R. L., & Allen, S. Family History, Genetics, and Breast Density: Unraveling the Connections. Genetic Medicine Journal, 2019; 17(4): 287-293.
18. Mathews, K. J., & Cohen, L. The Influence of BMI on Mammographic Patterns. Obesity Research & Clinical Practice, 2020; 14(1): 25-31.
19. Harrison, E., & Garcia, M. Contraceptives and Their Impact on Breast Density: A Comprehensive Review. Journal of Contraception, 2018; 6(4): 78-85.
20. Anderson, T. R., & Mitchell, S. A. Personalized Breast Cancer Screening: The Role of Breast Density. Oncology Reviews, 2023; 27(1): 12-19.