

1 **Abstract**

2 **Background:** Mammography is the standard examination for breast cancer screening of woman
3 aged ≥ 40 years old. High breast density on mammography indicates that mammary gland
4 parenchyma occupy a high percentage of the breast. The objective of this study was to
5 investigate factors associated with breast density and the risk of high breast density for breast
6 cancer .

7 **Methods:** A multicenter case-control study was performed in 530 patients and 1,043 controls.
8 Breast density was classified as C1-C4 using the Breast Imaging Reporting and Data System
9 (BI-RADS). Clinical factors were obtained from questionnaires or medical records, and the
10 influence of each factor (breast density, menopausal status, body mass index(BMI), parity, presence
11 or absence of breastfeeding history, age at menarche, age at first birth, and familial history of breast
12 cancer) on breast cancer risk in all patients was calculated as an age-adjusted odds ratio (OR).

13 Multivariate logistic regression analyses were then performed in all patients and in pre- and
14 postmenopausal and BMI-stratified groups using factors with a significant age-adjusted OR as
15 adjustment factors.

16 **Results:** Age-adjusted ORs for breast cancer were significant for breast density, BMI, parity,
17 and breast feeding, but not for age at menarche, age at first birth, or family history of breast
18 cancer. In multivariate analysis, there was a significant correlation between breast density and
19 breast cancer in postmenopausal women (OR for C1 vs. C2 1.90 [95% CI: 1.34-2.70]; C1 vs.
20 C4 2.85 [95% CI: 1.10-7.16]). This correlation was also significant in patients in the third BMI
21 quartile (22.3-24.5 kg/m²) (OR for C1 vs. C4 8.76 [95% CI: 2.38-42.47]); and fourth BMI

1 quartile ($>24.5 \text{ kg/m}^2$) (OR for C1 vs. C2 1.92 [95% CI: 1.17-3.15] ; C1 vs. C4 11.89 [95% CI:
2 1.56-245.17]).

3 Conclusion: Breast density on mammography is a risk factor for breast cancer after adjustment
4 for other risk factors. This risk is particularly high in postmenopausal women and those with a
5 high BMI.

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7 Key words: mammography, breast density, breast cancer, postmenopausal, BMI