Correlation of Breast Density with Age, BMI and Gail Score: A Retrospective Data Analysis Study

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Methods

A retrospective cohort design was used including all patients age 40 and older with a MammoPlus® screening mammogram with the NCI Breast Cancer Assessment tool (Gail Model) 5-year and lifetime assessment.

Breast Density was classified as:

- 1: “Almost entirely fatty” (~25% glandular)
- 2: “Scattered fibroglandular densities” (25-50% glandular)
- 3: “Heterogeneously dense” (51-75% glandular)
- 4: “Extremely dense” (>75% glandular)

A Pearson correlation was used to determine any correlation of Breast Density with quantitative variables, such as BMI, Gail Score (5 yr), Gail Score (Life) and other demographics.

Breast Density and Age (years) had a negative correlation (Pearson Correlation -0.097). Breast Density and 5-year Gail risk had a positive correlation (Pearson Correlation 0.175). Breast Density and lifetime Gail score had a positive correlation (Pearson Correlation 0.415).

With respect to contributing factors to greater breast density, linear regression analysis demonstrated the following statistically significant associations with breast density:

- Positively with age of first live birth (r=0.100), age of menarche (r=0.186) and number of prior breast biopsies (r=0.252)
- Negatively with BMI (r=-0.368)
- Age (r=-0.368)

Demographics

<table>
<thead>
<tr>
<th>Demographic Variable</th>
<th>Mean ± Std. Deviation</th>
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<tbody>
<tr>
<td>Age (years)</td>
<td>56.80 ± 10.461</td>
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<tr>
<td>Height (inches)</td>
<td>64.49 ± 2.726</td>
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<tr>
<td>Weight (pounds)</td>
<td>160.08 ± 41.833</td>
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<tr>
<td>BMI</td>
<td>28.35 ± 6.7703</td>
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<tr>
<td>Gail Score (5 yr)</td>
<td>1.57 ± 1.0647</td>
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<tr>
<td>Gail Score (Life)</td>
<td>9.345 ± 4.7085</td>
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<tr>
<td>Age of menarche (years)</td>
<td>12.90 ± 1.790</td>
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<tr>
<td>Age of 1st live birth (years)</td>
<td>24.28 ± 5.012</td>
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<tr>
<td># of 1st deg relatives with breast cancer</td>
<td>0.20 ± 0.460</td>
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<tr>
<td>History of prior breast biopsy</td>
<td>0.23 ± 0.825</td>
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<tr>
<td>Breast density</td>
<td>2.23±0.771</td>
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</table>

Results

1200 patients were reviewed with relevant demographic data of the study population are reflected in the demographics table.

Statistically significant relationships were identified between:
- Breast Density and Race (p=0.017)
- Positive correlation between:
  - Breast Density and lifetime Gail score (r=0.175)
- Inverse correlation between:
  - Breast Density and Age (r=-0.252)
  - Breast Density and 5-year Gail risk (r=-0.097)

Further analysis of the Gail score variance demonstrates age to be directly correlated with Gail 5-year score (r=-0.415) and inversely correlated with lifetime Gail score (r=-0.434).

A previous history of breast cancer/DCIS/LCIS, number of first degree relatives with breast cancer, and number of prior biopsies did not significantly contribute to breast density.

With respect to contributing factors to greater breast density, linear regression analysis demonstrated the following statistically significant associations with breast density:

- Positively with age of first live birth (r=0.100), age of menarche (r=0.186) and number of prior breast biopsies (r=0.252)
- Negatively with BMI (r=-0.368) and age (r=-0.256)

Conclusions

Our data suggest that increasing age and BMI correlate with decreased breast density, consistent with previous research.

The relationship between Gail scores and breast density is largely due to the impact of age on both the Gail scores and the breast density.

However, age of parity, age of menarche, and number of previous breast biopsies were also positively associated with breast density, although not highly. This may suggest an underlying pathophysiologic link between breast density and Gail score, but requires further study.

References