A Retrospective Review of Demographics and BMI on ER Positive and Negative Breast Cancer in Rural Southeast Alabama

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Abstract

Breast cancer remains a leading health concern among women, with Estrogen Receptor (ER) status influencing prognosis and treatment. Rural populations often face disparities in access and outcomes, yet data remains limited. This study evaluates the relationship between Body Mass Index (BMI), demographics, and ER status in breast cancer patients from Southeast Alabama. By analyzing a large rural cohort, we highlight how elevated BMI, type 2 diabetes, tobacco use, race, and family history may influence ER(+) disease, offering insights that may guide future preventive strategies and targeted screening efforts in underserved communities.

Introduction

Breast cancer remains a major health challenge in Alabama, with incidence and mortality rates reflecting persistent disparities across rural and urban populations. In rural Southeast Alabama, unique socioeconomic factors, limited healthcare access, and demographic trends influence the burden and outcomes of breast cancer (1,2,4). Estrogen receptor (ER) status serves as a crucial biological marker guiding prognosis and therapeutic strategies, yet local factors such as body mass index (BMI) and population characteristics may impact the distribution and behavior of ER positive (ER+) and ER negative (ER-) breast cancers. This retrospective review aims to characterize demographic profiles and BMI distributions among women diagnosed with ER+ and ER- breast cancer in rural Southeast Alabama, providing insight into local patterns and supporting tailored approaches to cancer prevention and care in medically underserved regions (2,4).

Methods and Materials

We reviewed data from July 2018 to June 2025 using our institution's Epic database, SLICER DICER. BMI was categorized according to the World Health Organization (WHO) adult classification. International Classification of Disease (ICD) codes were used to extract data from Slicer Dicer. The study population (n=1421) consisted of individuals from rural communities in Southeast Alabama.

	ER +	ER-
White	70.9%	62%
Black	26.6%	37.1%
Other	2.5%	.9%

Table 1: Racial Distribution of ER positive and ER negative breast cancer among women in Southeast Alabama.

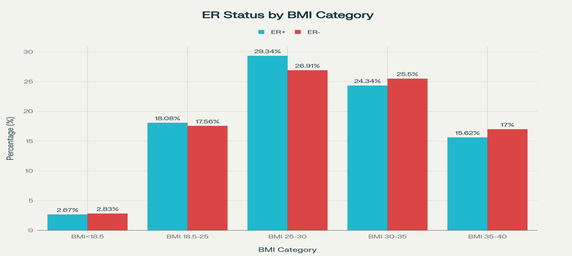


Figure 1: BMI distribution of ER positive and ER negative breast cancer among women in Southeast Alabama.

Results

Comparisons were made between ER(+) breast cancer and ER(-) breast cancer in adult BMI classifications per WHO. Average age for ER(+) breast cancer was 70.1±.7 years and average age for ER(-) breast cancer was 73.1±.7 years. The ER(+) population was 70.9% white, 26.6% black, and 2.5% other. The ER(-) population was 62% white, 37.1% black, and 0.9% other (table 1). Comparisons between BMI for ER(+) vs ER(-) breast cancer respectively; BMI less than 18.5 was 2.67% vs 2.83%; BMI 18.5-25, 18.08% vs 17.56%; BMI 25-30, 29.34% vs 26.91%; BMI 30-35, 24.34% vs 25.5%, BMI 35-40, 15.62% vs 17% (Figure 1). Comparison with respect to Type 2 Diabetes Mellitus diagnosis for ER(+) vs ER(-) breast cancer respectively was 31%±3.2% vs 30.4±6.7%. Comparison with respect to positive family history for ER(+) vs ER(-) breast cancer respectively was 30.9%±3.3% vs 36.5%±7%. The comparison of tobacco use with respect to ER (+) vs ER(-) breast cancer was 40.1%±3.4% vs 40.9%±7.2% (Figure 2). Analysis using χ^2 test (χ^2=889.32) with p<.001 showed that there is an association between BMI and developing breast cancer.

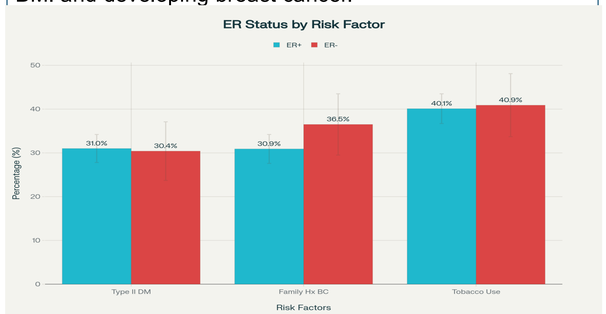


Figure 2: Risk factor distribution of ER+ and ER – breast cancer in women in southeast Alabama.

Discussion

In rural Southeast Alabama, ER positive and ER negative breast cancer cases display similar patterns across BMI categories, with most patients falling in the overweight and obese ranges (BMI 25-35). Fewer cases occur in underweight and higher BMI groups. These trends emphasize the importance of modifiable risk factors, such as BMI, in regional breast cancer epidemiology. The dominance of overweight and obesity calls for targeted health education and intervention programs, yet socioeconomic barriers and limited healthcare access remain major obstacles impacting both disease risk and overall patient outcomes (2,3).

Conclusions

In this large rural cohort, elevated BMI, type 2 diabetes, and tobacco use were significantly associated with ER(+) breast cancer (p<.001). White patients were more likely to have ER(+) breast cancer (p<.001 OR=1.6) at our institution. Black women are more likely to have ER(-) breast cancer (p<.001 OR=1.5). The obesity prevalence in post- menopausal women in our population (54%) surpasses national prevalence of obesity in post-menopausal women (43%) per National Institute of Health (NIH), highlighting a critical regional disparity. Our findings suggest that modifiable metabolic and lifestyle factors may contribute to increased ER(+) breast cancer risk in underserved communities. Patients may benefit from further emphasis being placed on metabolic health and early intervention to address prevention. This also brings into light the lack of access to metabolic care in the area. These results underscore the need for future studies and public health initiatives focused on prevention, early detection, and risk stratification tailored to rural populations.

Contact

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