



Effect of Age on Breast Cancer in Women: A Literature Review

Bandana Kumari Soni

Assistant Professor(Zoology)

Jai Prakash University Chapra, Bihar

1. Introduction

Age is one of the most important determinants influencing the **incidence, biological behavior, clinical presentation, treatment response, and prognosis** of breast cancer in women. Globally, breast cancer predominantly affects middle-aged and older women; however, younger women diagnosed with breast cancer often experience more aggressive disease and poorer outcomes. The impact of age on breast cancer is multifactorial, involving hormonal exposure, genetic predisposition, tumor biology, screening practices, and treatment decisions [1,2]. Understanding age-related differences is essential for optimizing early detection strategies and individualized management.

Keywords

Breast cancer, Age, Aggressive, Hormonal exposure, Screening

2. Age and Breast Cancer Incidence

2.1 Increasing Risk with Advancing Age

The incidence of breast cancer increases steadily with age, particularly after 40 years, reflecting cumulative exposure to estrogen, accumulation of genetic mutations, and age-related biological changes [3,4]. Epidemiological data from population-based cancer registries indicate that the majority of breast cancer cases are diagnosed in women aged 50 years and above [5]. According to SEER and global cancer statistics, incidence rates peak in postmenopausal women, highlighting age as a dominant risk factor [6].

2.2 Breast Cancer in Younger Women

Breast cancer in women under 40 years of age accounts for a smaller proportion of total cases but represents a significant clinical challenge. Several studies suggest a rising incidence of early-onset breast cancer in certain populations [1,7]. Younger women are less likely to undergo routine screening, leading to delayed diagnosis and presentation at more advanced stages [2,8].

3. Age and Tumor Biology

3.1 Tumor Characteristics in Young Women

Breast cancers diagnosed in younger women tend to exhibit **more aggressive biological features**, including higher histological grade, increased proliferative index, hormone receptor negativity, HER2 overexpression, and a higher prevalence of triple-negative breast cancer [1,9,10]. Studies consistently report that young age is associated with unfavorable molecular subtypes, which partially explains poorer clinical outcomes despite intensive treatment [11].

3.2 Tumor Biology in Older Women

In contrast, breast cancer in older women is more frequently characterized by **estrogen receptor–positive and lower-grade tumors**, which often respond well to endocrine therapy [12]. However, undertreatment remains a concern in elderly patients due to comorbidities, frailty, and physician bias, potentially compromising survival outcomes [13].

4. Prognostic Impact of Age

4.1 Prognosis in Young Women

Young age at diagnosis has been identified as an independent adverse prognostic factor in several cohort studies. Women under 35–40 years often demonstrate worse disease-free survival and overall survival compared with older women, even after adjustment for tumor stage and subtype [9,14]. Very young women with early-stage breast cancer who do not receive adequate adjuvant therapy face a significantly higher risk of recurrence and mortality [10].

4.2 Prognosis in Older Women

Survival outcomes in elderly women with breast cancer are influenced not only by tumor biology but also by competing risks from comorbidities and reduced tolerance to aggressive therapies [12,13]. Several studies report a **U-shaped relationship** between age and breast cancer survival, with the best outcomes observed in middle-aged women and poorer outcomes at the extremes of age [15].

5. Age and Treatment Considerations

5.1 Treatment Patterns

Younger women are more likely to receive aggressive multimodal treatments, including chemotherapy and extensive surgery, reflecting both biological aggressiveness and longer life expectancy [9,11]. However, aggressive treatment does not always offset the poor prognosis associated with young age [14].

Conversely, older women are less likely to receive chemotherapy or radiotherapy, even when clinically indicated, leading to potential undertreatment and inferior outcomes [12,13].

5.2 Screening and Early Detection

Age-based screening guidelines strongly influence breast cancer detection patterns. Mammography screening typically targets women aged 40 or 50 and above, contributing to early diagnosis in middle-aged women while potentially delaying detection in younger women and very elderly populations [5,6].

6. Discussion

Age acts as a **surrogate marker** encompassing biological, hormonal, genetic, and healthcare-related factors that collectively influence breast cancer risk and outcomes [2,11]. While older age increases incidence, younger age is often associated with aggressive disease and poorer prognosis. Importantly, age alone should not dictate treatment decisions; instead, a comprehensive assessment of tumor biology, patient fitness, and preferences is essential [12,13].

Despite extensive research, gaps remain regarding the independent prognostic value of age across molecular subtypes and the optimal screening strategies for younger women at increased risk [1,15].

7. Conclusion

Age significantly affects breast cancer in women across multiple dimensions. Incidence increases with advancing age, yet younger women often present with biologically aggressive tumors and worse outcomes. Both young and elderly women experience unique challenges related to diagnosis, treatment, and survival. Future strategies should emphasize **age-appropriate screening, biologically driven treatment decisions, and equitable care across all age groups** to improve outcomes for women with breast cancer.

Table 1. Age-related differences in tumor biology

Age Group	Common Subtypes	Biological Features	Clinical Implication
Young (<40)	Triple-negative, HER2+	High proliferation, genetic mutations	Aggressive treatment required
Middle (40–60)	Luminal A/B	Hormone-driven	Good endocrine response
Elderly (>60)	Luminal A	ER-positive, lower proliferation	Individualized therapy

Table 2. Prognosis and treatment considerations by age

Age Group	Stage at Diagnosis	Prognosis	Treatment Strategy
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Young	Often advanced	Higher recurrence risk	Aggressive multimodal therapy
Middle-aged	Variable	Best overall outcomes	Standard guidelines
Elderly	Often early but variable	Competing mortality	Geriatric Assessment based care

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