



## WEIGHT GAIN AND BREAST CANCER IN PREMENOPAUSAL PHASE OF WOMEN

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**ABSTRACT** Breast cancer (BC) is one of the leading causes of cancer mortality in female in the world. It is the second most common cancer among Indian women.(1). It is accounted for 25% of female cancer cases at all ages and for a greater percentage among young women. (2,3). Various studies reported that increased adiposity in childhood and before menopause is inversely associated with the risk of breast cancer diagnosed at premenopausal and postmenopausal ages, whereas increased adiposity after menopause is positively associated with risk.(3-13). Obesity is associated both with a higher risk of developing breast cancer, particularly in postmenopausal women, and with worse disease outcome for women of all ages(14). In this study we considered copious studies concerning with weight gain and breast cancer in premenopausal phase of women. Thereafter in the last section of the study conclusion is made.

**Discussion:** Being a woman is a risk factor for being diagnosed with breast cancer. Studies scrutinized, are reflecting that obesity as well as premenopausal and postmenopausal phases impersonate their significance in accentuated disease occurrence.

**KEYWORDS :** Weight Gain, Breast Cancer ,Premenopausal Phase

## INTRODUCTION

Breast cancer is the most common cancer diagnosed among women worldwide, with an estimated 1.67 million cases diagnosed in 2012, accounting for a quarter of all new cancers in women. Breast cancer is also the most common cancer diagnosed among women aged 15–39 years worldwide (15). In literature obesity is reported to be increased in adolescents from 2.6% in 1988 to 1994 to 9.1% in 2013 to 2014 (16-18). In 2014, the National Health and Nutrition Examination Surveys is found to be reported that in the United States, 35.0% of adult men and 40.4% of adult women were obese as measured by BMI. Between 2005 and 2014, there was an increased prevalence of obesity (from 35.3% to 40.4%) and severe obesity (BMI >40 kg/m<sup>2</sup>) (from 7.4% to 9.9%) in women, whereas, no statistically significant increase was observed in men.(16,17).

## Definition of obesity

According to the Centers for Disease Control and Prevention (CDC), a body mass index (BMI)  $\geq 30$  kg/m<sup>2</sup> is defined as obesity or metabolically unhealthy (19-21,4). Obesity is a major health problem of particular importance in developed countries, such as the United States, where obesity affects more than 36% of adults (18,4). Abdominal obesity, as measured by WHR or by waist circumference, is found reported, another commonly used measure of obesity or poor metabolic health. Women with a WHR of  $\geq 0.85$  were considered to be at substantially increased risk for metabolic complications by the World Health Organization.(20,22).

## METHODOLOGY

The studies considered were adopted using search engine Pubmed, and Google. Selected studies have their concern with the title undergone i.e. weight gain and breast cancer in premenopausal phase.

## Findings

In one of the studies concerned, analysis of a study included 758  $\square$  592 women with median age, 40.6 years, among whom 13  $\square$  082 in situ or invasive breast cancer cases occurred during 7.2 million premenopausal years of follow-up with median age  $\square$  9.3 years. In this study weight at ages 18 to 24 years was found retrospectively reported for 96.9% and at later ages for less than 10% of women. Obesity (BMI  $\geq 30.0$ ) was observed more common in women who were 45 years or older (11.1%), were nulliparous (12.4%), had an early menarche (17.0%), had a family history of breast cancer (12.8%), or were black (26.8%)(3).

In one of the studies, a population-based analysis of global breast cancer incidence and mortality among premenopausal and postmenopausal women was conducted. In this study menopausal status was defined using age as a proxy, whereby breast cancer cases or deaths at age 50 years or older were regarded as postmenopausal. GLOBOCAN data was compiled to calculate age-standardized breast cancer incidence and mortality in 2018. In the same study incidence trends for 1998–2012 were assessed in 44 populations from 41 countries using the Cancer in Five Continents plus database, by calculating the annual average percent change. This study found

approximately 645 000 premenopausal and 1.4 million postmenopausal breast cancer cases worldwide in 2018, with more than 130 000 and 490 000 deaths occurring in each menopausal group. Countries with a very high human development index (HDI) were found having the highest premenopausal and postmenopausal breast cancer incidence (30.6 and 253.6 cases per 100 000, respectively), whereas countries with low and medium HDI were observed with the highest premenopausal and postmenopausal mortality, i.e. 8.5 and 53.3 deaths per 100 000, respectively. This study interpreted that early diagnosis and access to treatment remain crucial in low-income and middle-income countries(23).

We came across a study revealing that breast cancer is a leading cancer diagnosis among premenopausal women around the world. This study disclosed that, incidence rates of advanced breast cancer have increased in recent decades for premenopausal women (24).

One of the studies, used polygenic models for obesity and breast cancer to deconstruct the question, whether larger tumor mass is due to obesity-related barriers to detection, with having the objective of determining whether cell autonomous mechanisms contribute to the link between obesity and breast cancer burden. Study assessed the growth rates of 259 chemically induced mammary carcinomas from rats sensitive to dietary induced obesity (DS) and of 143 carcinomas from rats resistant (DR) to dietary induced obesity revealed that tumors in DS rats grew 1.8 times faster than in DR rats(25).

One of the case-control studies, investigated the etiology of breast cancer using various obesity indices and other epidemiological factors among breast cancer patients residing in and around Amritsar city. In this study, risk factors for breast cancer were analyzed in a total of 542 female among whom 271 females were breast cancer patients and 271 were unrelated healthy females matched for age as control females. Bivariate analysis of the study resulted a lower risk (OR=0.65, 95% CI 0.43-0.99, p=0.04) in obese cases with BMI  $\geq 25$  kg/m<sup>2</sup> as compared to subjects with normal BMI. Risk factor analysis was observed showing that parameter which provided risk for cancer in postmenopausal women was obesity and in premenopausal women was parity. Postmenopausal women with BMI (overweight: OR=0.39, 95% CI 0.17-0.92, p=0.03; obese: OR=0.26, 95% CI 0.13-0.52, p=0.00), WC (OR=0.17, 95% CI 0.05-0.52, p=0.00) and WHtR (p=0.02) had higher risk. In this study Premenopausal women with 3 or less than 3 children were found having a higher risk (OR=5.54, 95 % CI 2.75-11.19, p=0.00) than postmenopausal women when compared to women with more than 3 children (26).

A study identified 129 age-matched pairs. The mean age of breast cancer diagnosis was reported 37.5 years. Decreasing age of menarche was observed significantly increasing the risk of breast cancer (OR=1.67, 95% CI 1.09–2.56, P= 0.02). The risk was also found reported increased with accurate body mass index of  $\geq 25$  kg/m<sup>2</sup> (OR=5.24, 95% CI 1.10–24.9, P = 0.04). Age at first childbirth, parity, and breastfeeding were not observed significantly associated with premenopausal breast cancer risk (P > 0.05) (27).

We considered another case-control study, investigating the association between obesity in pre- and postmenopausal women with the development of breast cancer and the expression of estrogen, progesterone, Her-2 and triple-negative (TN) receptors. This study included 100 patients with recently diagnosed breast cancer and 400 age-matched controls. The women were divided into pre- and postmenopausal groups. Results of this study showed that postmenopausal women with a BMI  $\geq 30$  kg/m<sup>2</sup> at pre-diagnosis and at the most recent measurement were 1.50 (95% CI 1.06-2.13) and 1.56 (95% CI 1.11-2.21) times more likely to develop breast cancer, respectively. According to this study these women had a prevalence of obesity of 27.7% when considering pre-diagnosis BMI and 29.4% when analyzing the indicator of recent BMI(28).

We considered a prospective observational study, considering, 74,177 women from the Nurses' Health Study from 1980–2012. This study unveiled that, weight at age 18 was inversely associated with both premenopausal (HR per 30 kg = 0.52, 95% CI = 0.39 – 0.71) and postmenopausal (HR per 30 kg = 0.81, 95% CI = 0.72 – 0.92) breast cancer which was largely explained by adiposity at age 10. Long-term weight gain from age 18 both during premenopause and postmenopause were scrutinized as positively associated with postmenopausal breast cancer risk. Whereas, premenopausal weight gain was not found related to premenopausal breast cancer risk. However, weight gain since age 18 was reported positively associated with ER+/PR+ postmenopausal breast cancer (HR per 30 kg = 1.50, 95% CI = 1.36 – 1.65) but not ER+/PR– (HR per 30 kg = 0.96, 95% CI = 0.78 – 1.19) or ER–/PR– (HR per 30 kg = 1.16, 95% CI = 0.95 – 1.42) postmenopausal breast cancer (29).

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