Prevalence of Obesity in Breast Cancer Patients of Pakistan

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Abstract
Objective: To determine the prevalence of obesity in breast cancer patients, in addition to its relation with menopausal status.
Study Design: Cross-sectional Study, Convenience sampling.
Place and Duration: This study was conducted in a tertiary care hospital setting from October 2018 to December 2020 for a period of 2 years.
Materials and Methods: A total of 311 women diagnosed with breast cancer, selected randomly from outpatients were recruited. Based on BMI (Body Mass Index) that was calculated from patients registered height and weight. Prevalence of overweight (BMI ≥ 25 <30), obese (BMI ≥ 30 <40), and severely obese (BMI ≥ 40) breast cancer patients was determined and their association with menopausal statuses was also analyzed.
Result: Breast Cancer patients in Pakistan had a prevalence of overweight of 34.4%, obesity of 39.2% and severely obese of 7.4%. The mean BMI was above normal for pre-menopause, perimenopause and postmenopausal patients (28.2, 33.4, and 30.7 respectively).
Conclusion: Breast cancer patients in Pakistan show a significant prevalence of overweight and obesity. Obesity is especially predominant in perimenopause and postmenopausal breast cancer patients in our population.
Keywords: Breast cancer; Overweight; Obesity; Menopausal status

Introduction
Obesity is now considered a concern worldwide, as it is being labeled a major risk factor for most of the pathological conditions. According to WHO, in 2016, more than 1.9 billion adults aged 18 years and older were overweight; of these over 650 million adults were obese [1]. Furthermore, in the developing world, obesity is a known risk factor for several cancer morbidities and mortalities [2].

One of which is 'breast cancer', out of several escalating cancers all over the world. It is the most common cancer in women worldwide, contributing 25.4% of the total number of new cases diagnosed in 2018 [3]. Its risk factors fall into two categories, modifiable and un-modifiable. The modifiable ones include: unbalanced diet, late first full term birth, not proper breastfeeding, obesity and history of hormone treatments all of which if avoided can bring down the risk of acquiring breast cancer; whereas the unmodifiable are increasing age, female gender and genetic predisposition. It has become very common in the United States, and other developed Western countries, as well as developing ones [4]. Despite one of the best medical facilities in the West, there are high incidence rates. On the other hand, the developing world is yet to establish these facilities, which is a great challenge in lowering the incidence of cancer here. Breast cancer 5-year survival rates range from 80% in North America, Sweden, and Japan to 60% in middle-income countries to 40% in low-income countries [5].

A meta-analysis on obesity in relation to postmenopausal breast cancer overwhelmingly supports elevated relative risk when compared to normal body mass [6]. In postmenopausal obese women, the increased levels of circulating estrogen coming from raised aromatase activity, in adipose tissues of breast, abdomen, thigh and buttock can be a factor for development and progression of breast cancer [7-9]. A case-control study in Iran concluded that, ‘Obesity in postmenopausal women could increase risk of breast cancer’ [10].

According to studies done around the world suggest that, there is a positive association of each risk factor to breast cancer. A case-control study in Pakistan found that the risk of developing breast
cancer increases with increased BMI, plus it analyzed various risk factors associated with higher risks of developing breast cancer [11].

Additionally, other researches confirms that obesity is one of the leading association to breast cancer in women, and obese patients have comparatively worse prognosis of breast cancer than normal weight patients as the stage at which they are diagnosed is rather late and tend to progress [12-14].

This study is being done to establish data regarding the association of obesity and breast cancer in our country. In this work we intend to highlight the prevalence of obesity in patients of breast cancer and its correlation with premenopausal, perimenopausal and post-menopausal status, which has not yet been analyzed separately in any study previously done in Pakistan.

Materials and Methods

Study design and participants

This was a cross-sectional study with 311 women diagnosed with breast cancer selected through convenience sampling over a period of four months from outpatients between the years 2018 to 2020; participants were recruited from the breast clinic of Liaquat National Hospital. Patient data was collected through a perform at the time of their arrival in the outpatient breast clinic.

Research and ethical committee

The ethical committee in the institution approved this study.

Variables

Participant’s body weight and height were taken (registered on first OPD registration) and Body Mass Index (BMI) was calculated. Patients were classified by following the Center for Disease Control’s (CDC) criteria [15]

- BMI < 18.5, is underweight.
- BMI of 18.5 to <25, is normal.
- BMI of 25.0 to <30, is overweight.
- BMI of 30.0 or higher, is obese.
- BMI of 40 or higher, is class 3 obesity and sometimes categorized as "extreme" or "severe" obesity.

The menopausal status of the participants was defined as:

- The term menopause is defined as the permanent cessation of menstruation or surgical removal of ovaries (i.e. bilateral oophorectomy)[16].
- The term perimenopause is defined as the whole of the reproductive period prior to the menopause [16].
- The term postmenopause is defined as the period immediately prior to the menopause [16].
- The term postmenopause is defined as dating from the menopause onwards [16].

Patients with breast pathologies other than breast cancer were excluded from this study.

Data and statistical analysis

Data analyzed using SPSS (Windows version) software. For all tests, a p value <0.05 was considered statistically significant. Associations between BMI and other variables were examined using Pearson Chi-square testing and Fisher’s exact test. Quantitative variables were presented as averages and their respective measures of statistical dispersion. Qualitative variables were shown as frequencies and percentages.

Results

Participants Characteristics: A total of 311 participants diagnosed with breast cancer were taken on this study (By taking the prevalence of obesity in breast cancer patients, p=28.15% [26] using margin of error (d) =5%. The total calculated sample size is 311 patients with the help of WHO software for sample size calculation taking 95% confidence level). Mean age was 51 years, ranging from 23 to 89 years old. All participants were females; most of them were residents of Karachi (i.e. 232, 74.6%). Based on BMI, there were only 3(1%) underweight

| Table 1: Descriptive Statistics. |
| Age (Mean) | 51.46 ± 12.82 |
| Highest - 89 Lowest - 23 |
| Gender (Female) | 311 100 |
| Residence |
| Karachi | 232 74.6 |
| Hyderabad | 20 6.4 |
| Other | 59 19 |
| BMI Status |
| Underweight | 3 1 |
| Normal | 56 18 |
| Overweight | 107 34.4 |
| Obese | 122 39.2 |
| Severely Obese | 23 7.4 |
| Menopausal Status |
| Premenopause | 67 21.5 |
| Perimenopause | 53 17 |
| Postmenopause | 191 61.4 |
| Surgical History |
| None | 274 88.1 |
| TAH+BSO | 14 4.5 |
| Hysterectomy OR Tubal ligation | 23 7.4 |
| Estrogen-Containing Pills |
| None | 272 87.5 |
| HRT | 34 10.9 |
| OCP | 2 0.6 |
| For Conception | 3 1 |
| Family History |
| None | 245 78.8 |
| Breast Ca | 46 14.8 |
| Other | 20 6.4 |
| Parity (Mean=3) |
| 0-2 | 102 32.8 |
| 03-Oct | 209 67.2 |
| Hormonal Status |
| Negative | 94 30.2 |
| Positive | 217 69.8 |
patients, 56 (18%) were normal, 107 (34.4%) overweight, 122 (39.2%) obese and 23 (7.4%) severely obese. Out of 311; 191 (61.4%) patients were premenopausal, 53 (17%) perimenopausal, and 67 (21.5%) premenopausal. Majority had no surgical history (i.e. 274, 88.1%), and only 14 (4.5%) had total abdominal hysterectomy with bilateral salpingo-oophorectomy done. Most of the patients have never had estrogen-containing pills (i.e. 272, 87.5%), no family history (i.e. 245, 78.8%). Mean parity in our sample was 3 from a range of 1 to 10, 102 (32.8%) were below mean and 209 (67.2%) were above mean. Hormonal status was positive for 217 (69.8%) of the patients. All the variables are mentioned in detail below (Table 1).

BMI & Its correlations with Menopausal status and other variables: The mean BMI was above normal for pre-menopause, perimenopause and postmenopausal patients (28.2, 33.4, and 30.7 respectively) Table 2. BMI was correlated to menopausal status, it showed that more of postmenopausal women had higher BMIs followed by premenopausal and perimenopausal respectively, except that 6 (26.1%) of perimenopausal patients were severely obese compared to only 1 (4.3%) of premenopausal patient. Association of higher BMI was not found statistically significant for estrogen exposure (p=0.66), Family history (p=0.792), Hormonal Status P-value, p=0.205. Only parity showed a positive relation with BMI values above normal (p=0.008) (Table 3).

**Discussion**

Breast Cancer is one of the most frequently occurring cancers in Pakistan. And its incidence is highest here among all the other Asian countries [20], it is estimated to be 2.5 times of India and Iran [21]. This study describes the prevalence of obesity in Pakistani breast cancer patients and analyzes the relationship of BMI with menopausal status and other prognostic factors. The prevalence of obesity in our study population was 46.6%. While this prevalence is approximately double of that reported for breast cancer patients in Colombia (28.15) [26], contradicting this the rate of obese breast cancer women was very low in Japanese population (3.2%) than the Western population (~20% to 30%) [17-19]. The population in terms of obesity is very different in every country. According to the above mentioned data, the prevalence of breast cancer in obese patients varies with different populations.

Several observational studies have reported that the relationship between obesity and breast cancer risk is modified by postmenopausal HT use [22-25]. Although in our population there was no significant association of estrogen-containing treatments taken with BMI status (p=0.66). On the other hand, it does show that mean BMI of premenopausal, perimenopausal and postmenopausal patients were all either overweight or obese. This also reveals that most of the obese in our sample were postmenopausal, which was again statistically insignificant (p=0.301). These results can be partially described as twofold rise in prevalence of obesity in postmenopausal group of our study compared to that of prior studies [26]. In one study, obesity was associated with a decreased risk of developing ER-positive breast cancer in premenopausal women, while being associated with a higher risk in post-menopausal women. Suzuki et al. [27] found no correlation between obesity and ER-negative breast cancer.

Various studies have stated the direct relation of positive family history and risk of developing breast cancer. As Shamsi et al. [28] confirmed its role as a risk factor [28-32]. Our data set does not show an association between family history of breast cancer with obesity (p=0.792).

In our set of data, mean parity was 3, and most of the patients had more than 3 children. Among parous women only post-menopausal females having <3 children were at increased risk for breast cancer (OR: 4.5, 95% CI 1.8-11.5) compared with females having >3 children [33]. Parity was positively related to obesity in our population and was statistically significant (p=0.008).

There are limitations of this study, such as precise sample size, single-center study, with few variables. However, the findings can be used as epidemiological values for our region, and further studies are required to elaborate on the results found in this study.

**Conclusion**

In conclusion, the results of this study show a high prevalence of overweight and obesity in breast cancer patients of Pakistan. Plus, it also shows that, obesity is especially predominant in perimenopause and postmenopausal breast cancer patients here. It suggests that measures to manage obesity after menopause can control the rapidly prevailing breast cancer in the country; however, more comprehensive studies can be done to prove this.

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