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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 premenopause is defined as the whole of the reproductive period prior to the menopause [16].

- The term perimenopause 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	**Frequency**	**%**
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

Table 2: Menopausal status.

Menopausal Status	Mean BMI
Premenopause	28.2
Perimenopause	33.4
Postmenopause	30.7

Table 3: Association of different factors with BMI status.

	BMI Status			P-Value
	Overweight (%)	Obese (%)	Severely Obese (%)	
Menopausal Status				
Premenopausal	23 (21.5)	26 (21.3)	1 (4.3)	
Perimenopausal	17 (15.9)	20 (16.4)	6 (26.1)	0.301
Postmenopausal	67 (62.6)	76 (62.3)	16 (69.6)	
Estrogen-Containing Pills				
None	95 (88.8)	106 (86.9)	17 (73.9)	
HRT	9 (8.4)	16 (13.1)	5 (21.7)	0.66
OCP	1 (0.9)	0 (0.0)	1 (4.3)	
For Conception	2 (1.9)	0 (0.0)	0 (0.0)	
Family History				
None	85 (79.4)	99 (81.1)	19 (82.6)	
Breast Ca	13 (12.1)	17 (13.9)	2 (8.7)	0.792
Other	9 (8.4)	6 (4.9)	2 (8.7)	
Hormonal Status				
Negative	34 (31.8)	29 (23.8)	9 (39.1)	
Positive	73 (68.2)	93 (76.2)	14 (60.9)	0.205
Parity Status				
<3	37 (34.6)	36 (29.5)	1 (4.3)	
>= 3	70 (65.4)	86 (70.5)	22 (95.7)	0.008

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 postmenopause, 53 (17%) perimenopause, and 67 (21.5%) premenopause. 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.

Acknowledgement

References

1. WHO. Obesity and overweight. 2020.

2. Guh DP, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: A systematic review and meta-analysis. BMC Public Health. 2009;9:88.

3. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global Cancer Statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018;68(6):394-424.

4. Schneider AP, Zainer CM, Kubat CK, Mullen NK, Windisch AK. "The breast cancer epidemic: 10 facts." Linacre Q. 2014;81(3):244-77.

5. Coleman MP, Quaresma M, Berrino F, Lutz JM, Angelis RD, Capocaccia R, et al. Cancer survival in five continents: A worldwide population-based study (CONCORD). Lancet Oncol. 2008;9(8):730-56.

6. Renehan AG, Tyson M, Egger M, Heller RF, Zwahlen M. Body-mass index and incidence of cancer: A systematic review and meta-analysis of prospective observational studies. Lancet. 2008;371(9612):569-78.

7. Grodin JM, Siiteri PK, MacDonald PC. Source of estrogen production in postmenopausal women. J Clin Endocrinol Metab. 1973,36:207-14.

8. van Landeghem AA, Poortman J, Nabuurs M, Thijssen JH. Endogenous concentration and subcellular distribution of estrogens in normal and malignant human breast tissue. Cancer Res. 1985;45(6):2900-906.

9. Rose DP, Komninou D, Stephenson GD. Obesity, adipocytokines, and insulin resistance in breast cancer. Obes Rev. 2004,5(3):153-65.

10. Montazeri A, Sadighi J, Farzadi F, Maftoon F, Vahdaninia M, Ansari M, et al. Weight, height, body mass index and risk of breast cancer in postmenopausal women: A case-control study. BMC Cancer. 2008;8:278.

11. Bano R, Ismail M, Nadeem A, Haroon Khan M, Rashid H. "Potential risk factors for breast cancer in Pakistani women". Asian Pac J Cancer Prev. 2016;17(9):4307-12.

12. Neuhouser Ml, Aragaki AK, Prentice RL, Manson JE, Chelbowski R, Carty CL, et al. Overweight, obesity and postmenopausal invasive breast cancer risk. JAMA Oncol. 2015;1(5):611-21.

13. Cuello-López J, Fidalgo-Zapata A, Vásquez-Trespalacios E. Obesity and prognostic variables in colombian breast cancer patients: A cross-sectional study. Int J Breast Cancer. 2017;2017:9574874.

14. Ecker BL, Lee JY, Sterner CJ, Solomon AC, Pant DK, Shen F, et al. Impact of obesity on breast cancer recurrence and minimal residual disease. Breast Cancer Res. 2019:21(1):41.

15. CDC. Adult Overweight and Obesity.

16. WHO. Research on the Menopause. 1981;670.

17. Sestak I, Distler W, Forbes JF, Dowsett M, Howell A, Cuzick J. Effect of body mass index on recurrences in tamoxifen and anastrozole treated women: An exploratory analysis from the ATAC trial. J Clin Oncol. 2010;28(21):3411-5.

18. Ewertz M, Gray KP, Regan MM, Ejlertsen B, Price KN, Thurlimann B, et al. Obesity and risk of recurrence or death after adjuvant endocrine therapy with letrozole or tamoxifen in the breast international group 1-98 trial. J Clin Oncol. 2012;30(32):3967-75.

19. Gondo N, Sawaki M, Hattori M, Yoshimura A, Kotani H, Adachi Y, et al. Impact of BMI for clinical outcomes in Japanese breast cancer patients. Japanese J Clin Oncol. 2020;50(3):230-40.

20. Yasmeen F, Zaheer S. Functional time series models to estimate future age-specific breast Cancer incidence rates for women in Karachi, Pakistan. J Health Sci. 2014;2(5):213-21.

21. Asif HM, Sultana S, Akhtar N, Rehman JU, Rehman RU. Prevalence, risk factors and disease knowledge of breast cancer in Pakistan. Asian Pac J Cancer Prev. 2014;15(11):4411-6.

22. Chen WY, Hankinson SE, Schnitt SJ, Rosner BA, Holmes MD, Colditz GA. Association of hormone replacement therapy to estrogen and progesterone receptor status in invasive breast carcinoma. Cancer. 2004; 101(7):1490-500.

23. Huang Z, Hankinson SE, Colditz GA, Stampfer MJ, Hunter DJ, Manson JE, et al. Dual effects of weight and weight gain on breast cancer risk. JAMA. 1997; 278(17):1407-11.

24. Huang WY, Newman B, Millikan RC, Schell MJ, Hulka BS, Moorman PG. Hormone-related factors and risk of breast cancer in relation to estrogen receptor and progesterone receptor status. Am J Epidemiol. 2000;151(7):703-14.

25. Hou N, Hong S, Wang W, Olopade OI, Dignam JJ, Huo D. Hormone replacement therapy and breast cancer: Heterogeneous risks by race, weight, and breast density. J Natl Cancer Inst. 2013;105(18):1365-72.

26. Cuello-López J, Fidalgo-Zapata A, Vásquez-Trespalacios E. "Obesity and prognostic variables in Colombian breast cancer patients: A cross-sectional study". Int J Breast Cancer. 2017;2017:9574874.

27. Suzuki R, Orsini N, Saji S, Key TJ, Wolk A. Body weight and incidence of breast cancer defined by estrogen and progesterone receptor status-A meta-analysis. Int J Cancer. 2009;124(3):698-712.

28. Shamsi U, Khan S, Usman S, Soomro S, Azam I. A multicenter matched case control study of breast cancer risk factors among women in Karachi, Pakistan. Asian Pac J Cancer Prev. 2013;14(1):183-88.

29. Aghassi-Ippen M, Green MS, Shohat T. Familial risk factors for breast cancer among Arab women in Israel. Eur J Cancer Prev. 2002;11(4):327-31.

30. Ebrahimi M, Vahdaninia M, Montazeri A. Risk factors for breast cancer in Iran: A case-control study. Breast Cancer Res. 2002;4(5):10.

31. Norsa'adah B, Rusli BN, Imran AK, Naing I, Winn T. Risk factors of breast cancer in women in Kelantan, Malaysia. Singapore Med J. 2005;46(12):698-705.

32. Sezer H, Yilmaz M, Gurler H, Koyuncu A. Breast cancer risk factors in Turkey: A hospital-based case-control study. Asian Pac J Cancer Prev. 2011;12(9):2317-22.

33. Butt Z, Haider SF, Arif S, Khan MR, Ashfaq U, Shahbaz U, et al. Breast cancer risk factors: A comparison between pre-menopausal and post-menopausal women. J Pak Med Assoc. 2012;62(2):120-4.