ORIGINAL ARTICLE

OBESITY, FAT TOPOGRAPHY AND RISK OF CARCINOMA BREAST

Ayesha Khan, Kashif Rafique, Umer Farooq*, Khalid Khan

Department of Surgery, Ayub Teaching Hospital, Abbottabad, *Community Medicine Department Ayub Medical College, Abbottabad-Pakistan

Background: Carcinoma breast is most common cancer and the leading cause of cancer related deaths in women, with a multifactorial aetiology. This case control study was aimed at studying the possible link of body fat with the pathogenesis of carcinoma breast. **Methods:** A case control study extending over a period of two years (2015–2016) was conducted in which the body size and shape of 56 carcinoma breast cases was studied against 168 controls who had no breast disease. **Results:** Fifty-six women suffering from carcinoma breast had a higher BMI and fat distributed in the abdominal area A high BMI was found to be protective in pre-menopausal women (OR= 0.14 by; 95% CI: 0.02–0.77) while it was a risk factor in post-menopausal women (OR=2.39 by; 95% CI: 1.02–5.55). Waist-to-hip ratio (WHR) of ≥0.9 was associated with an increased risk of carcinoma breast compared to WHR ≤0.8 (OR=3.857 by; 95% CI: 0.875–17.05). **Conclusion:** the results show there is an increased risk of carcinoma breast in women having more fat cantered around the abdomen.

Keywords: Postmenopausal; Weight gain; Fat distribution; Fat topography; Carcinoma breast; Body mass index; Body shape; Obesity; Central obesity

J Ayub Med Coll Abbottabad 2017;29(3):419–21

INTRODUCTION

Breast cancer is the most common form of cancer in women, and also the leading cause of death due to cancer in women. The global load is about 23% of all cancer cases worldwide, with every woman at risk, regardless of whichever race geography or cultural background she belongs to. After Israeli women, Pakistan has the highest prevalence of breast cancer in Asia[1], with at least 90,000 new cases of breast cancer being diagnosed every year. In view of the outrageously heavy disease load, it is extremely important to understand the aetiology and epidemiology of carcinoma breast because in this form of cancer, early diagnosis and intervention can reduce morbidity and mortality significantly and most patients can return to a normal lifestyle. Among the risk factors incriminated in the pathogenesis of carcinoma breast, obesity is getting worldwide attention as it a modifiable factor. Indices such as height, weight, BMI, waist, the ratio of waist-to-hip ratio and weight changes are thought to be involved in the breast cancer aetiology.[2] One study conducted in Barbados correlated BMI with carcinoma breast and found it to be a positive factor in postmenopausal women and protective in premenopausal women[2], another suggested a high incidence in people with high BMI regardless of menopausal status[3]. Regarding Pakistan there has been no studies reported commenting on the risk of BMI and carcinoma breast. We herein report the results of a case control study conducted on the relationship of obesity and body shape according to menopausal status among Pakistani women over the course of two years in a tertiary care hospital.

MATERIAL AND METHODS

This was a case control study extending over the period of two years conducted in a tertiary care hospital. Breast cancer risk was examined in relation to body weight, height, BMI, and waist/hip ratio (WHR) in a tertiary care hospital in a time span of 2 years. Cases were 56 women diagnosed with breast cancer and confirmed on tissue biopsy, out of which 45 were post-menopausal and 11 were pre-menopausal, that presented to us in the breast clinic all belonging to different regions spread across northern areas of Khyber Pakhtunkhwa. Controls were 168 women free of breast disease as elicited on history and clinical examination, randomly selected from the hospital belonging to the same geographical region in the same proportion as cases on the basis of menopausal status.

On the basis of body mass index, the cases and control were divided into groups and the risk studied between normal and women with high BMI.

Central obesity was defined as waist to hip ratio (WHS) of more than 0.92, and peripheral obesity (pear shaped) as waist to hip ratio of less than 0.80 for women.

RESULTS

The mean age for the case group was 46.93 (SD=10.2) while that for the control group was 44.60 years (SD=12.2).

A high BMI was found to be protective in pre-menopausal women (OR=0.14; 95% CI: 0.02-0.77) while it was a risk factor in post-menopausal women (OR=2.39; 95% CI: 1.02–5.55).

Waist-to-hip ratio (WHR) of ≥0.9 was associated with an increased risk of carcinoma breast compared to WHR ≤0.8 (OR=3.857; 95% CI: 0.875–17.05).

The risk found to be significantly higher in postmenopausal women (OR =6.92 by; 95% CI: 1.02–294) than premenopausal women (OR = 0.45 by; 95% CI: 0.06–3.1).

Table-1: BMI, WHR and the association with carcinoma breast

Body mass index (BMI)					
BMI	Cases	Controls	*p*-value	OR	CI
High	39	109	0.315	1.50	0.75–3.00
Normal	14	59			
Body shape (WHR)					
WHR	Cases	Controls	*p*-value	OR	CI
≥0.9	54	147	0.041	3.857	0.875–17.05
≤0.8	2	21			

DISCUSSION

Breast cancer is the malignancy of breast tissue, which is by far the most common form of cancer and cancer related death in women. The incidence has been found to be increasing in developing countries.[4] With the advent of modern diagnostic tools, adjuvant therapy and evolving surgical interventions, the treatment options are constantly becoming better. While the prognosis of carcinoma breast has improved over time, the exact cause remains elusive. However, a number of risk factors have been identified that can aid in preventive programs. Risk factors include the genetics and environment, the reproductive experience, hormonal changes, host vulnerability, and the biologic determinants. But that is not the complete story. According to studies obesity[5] and weight gain after menopause[6] also lead to an increased risk of carcinoma breast, which, we have found to be in agreement with this study as well. High fat intake has also been incriminated, while weight loss after menopause and high vegetable intake has been found to be protective against this disease. Breast size as a risk, is controversial[7], however, augmentation with implants has found to reduce the risk of cancer[8]. According to some studies, for instance an Arican study on the same subject by Agurs-Collins *et al*, BMI and body shape were found to have no effect on carcinoma breast.[9] According to others though, one notably conducted in India, there was found to be an increased risk in both premenopausal and postmenopausal women having a high BMI and waist and hip circumference.[10] In our study however, the results show that the risk increased with increasing BMI in post-menopausal women while it was protective in premenopausal group. The underlying mechanism probably being the peripheral oestrogen metabolism in the abdominal fat. Along with increasing overweight and obesity throughout the world, the number of women who will be at risk for developing carcinoma breast will also go up scale.[11] It has been hypothesized that this increased risk of carcinoma breast in post-menopausal women is largely the result of increased serum levels of oestrogens particularly bioavailable estradiol.[12] The reason being, the biosynthesis of oestrogens is different before and after menopause.[13] Before menopause, oestrogen is produced in the ovaries but after menopause however, the bulk of oestrogen is produced by the peripheral conversion of androgens in the fat cells located around the abdomen by the enzyme aromatase. This mechanism can lead to local levels of oestrogen almost10-fold higher than the circulating levels[14,] but this cannot be measured by routine means. Studies show women with higher BMI to have increased insulin levels, but whether or not this plays a part in the pathogenesis of carcinoma breast remains unknown. One study suggests the increase in risk is related to hormone replacement therapy.[15] Another showed the women effected with carcinoma to be taller than their control counterparts[3], while another showed no significant difference[16]. The particular distribution of fat in the body poses a risk[17] with fat distribution more towards the trunk than the hips and thighs (central obesity/apple shape) having a higher risk than vice versa (pear shape). This is due to the fact that aromatase containing fat cells are centred around the abdomen rather than distributed peripherally. It follows that certain women who have a normal weight may have a fat distribution concentrated to the abdomen with slender arms and legs, and they can have a higher risk of developing carcinoma breast than a woman with a higher BMI but a peripheral fashion of fat distribution. So, BMI cannot be studied alone as a measure of risk without the understanding of its topography, as the results of this study show.

CONCLUSION

Since the aetiology of carcinoma breast is multifactorial, avoiding adult weight gain after menopause is an important preventive measure besides others. Also, frequent screening should be undertaken in women with a high BMI specially those having fat concentrated around the waist since they are at a higher risk of developing carcinoma breast.

AUTHORS' CONTRIBUTION

AK: Conception, design, drafting, acquisition and analysis of data. KR: Critical revision and acquisition of data. UF: Design, analysis and interpretation of data, critical revision. KK: Conception, critical revision and acquisition of data

REFERENCES

1. Memon ZA1, Qurrat-ul-Ain, Khan R, Raza N, Noor T. Clinical Presentation and Frequency of Risk Factors in Patients with Breast Carcinoma in Pakistan. Asian Pac J Cancer Prev 2015;16(17):7467–72.
2. Nemesure B, Wu SY, Hennis A, Leske MC. Body size and breast cancer in a black population--the Barbados National Cancer Study. Cancer Causes Control 2009;20(3):387–94.
3. Montazeri A, Sadighi J, Farzadi F, Mafroon 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(1):278.
4. Scutt D, Manning JT, Whitehouse GH, Leinster SJ, Massey CP. The relationship between breast asymmetry, breast size and the occurrence of breast cancer. Br J Radiol 1997;70(838):1017–21.
5. Morimoto LM, White E, Chen Z, Chlebowski RT, Hays J, Kuller L, *et al*. Obesity, body size, and risk of postmenopausal breast cancer: the Women's Health Initiative (United States). Cancer Causes Control 2002;13(8):741–51.
6. Barnes-Josiah D, Potter JD, Sellers TA, Himes JH. Early body size and subsequent weight gain as predictors of breast cancer incidence. Cancer Causes Control 1995;6(2):112–8.
7. Koch AD, Nicolai JP, de Vries J. Breast cancer and the role of breast size as a contributory factor. Breast 2004;13(4):272–5.
8. Tavani A, Pregnolato A, La Vecchia C, Negri E, Favero A, Franceschi S. Breast size and breast cancer risk. Eur J Cancer Prev 1996;5(5):337–42.
9. Agurs-Collins T, Adams-Campbell LL, Kim KS, Cullen KJ. Insulin-like growth factor-1 and breast cancer risk in postmenopausal African-American women. Cancer Detect Prev 2000;24(3):199–206.
10. Mathew A, Gajalakshmi V, Rajan B, Kanimozhi V, Brennan P, Mathew BS, *et al*. Anthropometric factors and breast cancer risk among urban and rural women in South India: a multicentric case-control study. Br J Cancer 2008;99(1):207–13.
11. Cleary MP, Grossmann ME. Minireview: Obesity and Breast Cancer: The estrogen connection. Endocrinology 2009;150(6):2537–42.
12. Hankinson SE, Willett WC, Manson JE, Hunter DJ, Colditz GA, Stampfer MJ, *et al*. Alcohol, Height, and Adiposity in Relation to Estrogen and Prolactin Levels in Postmenopausal Women. J Natl Cancer Inst 1995;87(17):1297–302.
13. Van Landeghem AA, Poortman J, Nabuurs M, Thijssen JH. Endogenous concentration and subcellular distribution of androgens in normal and malignant human breast tissue. Cancer Res 1985;45(6):2907–12.
14. Tavani A, Braga C, La Vecchia C, Parazzini F, Talamini R, Franceschi S. Height and breast cancer risk. Eur J Cancer 1998;34(4):543–7.
15. Lorincz AM, Sukumar S. Molecular links between obesity and breast cancer. Endocr Relat Cancer 2006;13(2):279–92.
16. Sonnenschein E, Toniolo P, Terry MB, Bruuing PF, Kato I, Koenig KL, *et al*. Body fat distribution and obesity in pre- and postmenopausal breast cancer. Int J Epidemiol 1999;28(6):1026–31.
17. Lahmann PH, Lissner L, Gullberg B, Olsson H, Berglund G. A prospective study of adiposity and postmenopausal breast cancer risk: the Malmö Diet and Breast Cancer Study. Int J Cancer 2003;103(2):246–52.

Received: 15 January, 2017	*Revised: 3 February, 2017*	*Accepted: 13 March, 2017*

Address for Correspondence:

Ayesha Khan, Department of Surgery, Ayub Teaching Hospital, Abbottabad-Pakistan
Email: aiciakhan@yahoo.com