

Obesity among Breast and Esophagus Cancer Patients of Amritsar District, Punjab

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KEYWORDS Body Mass Index. Obesity. Waist Circumference. Waist-Hip-Ratio. Cancer

ABSTRACT Obesity has been considered one of the most important known preventable causes of cancer. Most of the studies, on the association between obesity and risk of cancer have been reported from the well-developed countries, with limited data on association of obesity with cancer available from India. Therefore, in the present study, an attempt has been made to report the prevalence of overweight/obesity in female breast cancer and esophageal cancer patients of Amritsar. The data has been collected from the out patient department and surgical ward of Rotary Cancer Hospital, Guru Nanak Dev Hospital and Guru Ram Das Hospital of Amritsar. Height, weight, waist circumference and hip circumference measurement were taken on each subject to calculate their body mass index and waist-hip-ratio. The prevalence of overweight and obesity according to body mass index in breast cancer patients was quite high i.e. 52.5%, while in esophageal cancer patients the prevalence of underweight was quite high i.e. 45.0%. Among breast cancer patients, abdominal obesity according to waist circumference was 75% in pre-menopausal and 77.5% in post-menopausal women. According to waist-hip-ratio, it was 95% in pre-menopausal and 97.5% in post-menopausal women. Among esophageal cancer patients, abdominal obesity was 40% according to waist circumference and 85% according to waist-hip-ratio. It was evident from the present data that waist circumference and waist-hip-ratio identified more number of obese subjects than body mass index.

INTRODUCTION

Obesity has been considered as one of the most important known preventable causes of cancer (WHO 1998; Haslam and James 2005). Epidemiological studies (Key et al. 2002; Calle et al. 2003; Calle and Kaaks 2004) have associated obesity with a range of cancer types, particularly those cancers which are hormone dependent or gastrointestinal.

A longitudinal study of 7, 50, 000 men and women, done over a period of 12 years, observed that the mortality ratio for any cancer in obese men and women was 1.33 and 1.55 respectively (Lew and Garfinkel 1979). It has been reported in various other studies (Schapira et al. 1994; Swanson et al. 1996; WHO 1998; Borugian et al. 2003) that an increase in intra-abdominal fat accumulation increased the risk of post-menopausal breast cancer independent of relative weight and particularly when there was a family history of disease. According to World Cancer Research Fund report

on food and prevention of cancer, excess of body fat was a risk factor for post-menopausal breast cancer though it probably decreased the risk for pre-menopausal breast cancer (WCRF 2007). The abdominal fatness and weight gain in adulthood was probably associated with increased risk of breast cancer in post-menopausal women (Guh et al. 2009).

A high body mass index has been associated with an increase risk of breast cancer among post-menopausal woman (Tornberg et al. 1988; Vatten and Foss 1992; Huang et al. 1999). Increased values of anthropometric parameters like body mass index (BMI) ($>25 \text{ kg/m}^2$), hip circumference ($>100\text{cm}$) and waist circumference ($>85\text{cm}$) in South Indian post-menopausal women were found to be risk factors of breast cancer (Mathew et al. 2008). But on the other hand, leanness has been associated with increased squamous cell carcinoma of esophagus in North America (Gallus et al. 2001; Smith et al. 2008). A low body mass index reportedly increased the risk for esophageal squamous cell carcinoma (Ryan et al. 2006).

A meta-analysis of articles published between 1994-2006 from the U.S and Europe for postmenopausal breast cancer (Guh et al. 2009), identified 2755 articles and 30 articles meeting inclusive criterion and 14 were included in final meta-analysis. The risk for breast cancer for Waist Circumference were 1.13(1.01-1.07) for overweight and 1.30(1.17-1.44) for obesity while across

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categories of BMI, the IRRs were 1.08(1.03-1.14) for overweight and 1.13(1.05-1.33) for obesity. Out of identified 230 articles and 2 articles meeting inclusive criterion, only 1 was included in final meta-analysis for esophageal cancer. The risk for esophageal cancer based on overweight was 1.15(0.97-1.36) and 1.13(1.020-1.26) for females and males respectively. The corresponding risk for obesity were 1.20(0.95-1.53) and 1.21(0.97-1.52).

Most of the studies (Bergstrom et al. 2001; Calle et al. 2003; Boyle et al. 2003; Calle and Kaaks 2004) on the association between obesity and risk of cancer have been reported from the well-developed countries but only limited data on association of obesity with cancer has been available from India. In India, the incidence of cancer was approximately twice as high among urban than rural women, ranging from 25 to 30 per 100000 women. In a report from cancer registries (NCRP 2006), Karunagappally and Thiruvananthapuram cities of South India have consistently shown lower incidence than in urban registries (ranging from 7-20 per 100000 females). The unpublished data from Rotary Cancer Hospital, Vallah, Amritsar, has indicated an increased incidence of sporadic breast cancer and gastro intestinal tract cancer from Amritsar district of Punjab (Personal communication). A high prevalence of overweight/obesity has been reported in Amritsar district of Punjab (Sidhu et al. 2005). Therefore, in the present study, an attempt has been made to assess the prevalence of overweight/obesity in female breast cancer and esophageal cancer patients of Amritsar.

MATERIAL AND METHOD

In the present cross-sectional study, 100 female subjects i.e. 60 breast cancer patients and 40 esophageal cancer patients were studied. The data was collected from the out patient department and surgical ward of Rotary Cancer Hospital, Guru Nanak Dev Hospital and Guru Ram Das Hospital of Amritsar during 2006-2008. A detailed physical examination was carried out. The anthropometric measurements were taken at the time of diagnosis, prior to beginning any chemotherapy/ radiotherapy/ surgery. The information regarding age, habitat, dietary habits and physical activity was collected through the pre-tested interview schedules from each individual. All participants gave informed consent and this study was approved by the Guru Nanak Dev University ethical committee.

Height, weight, waist circumference and hip circumference measurement were taken on each subject using the standard protocol (Weiner and Lourie 1981). Body mass index (BMI) and waist-hip-ratio (WHR) were calculated for each subject.

Following table shows the critical limits of BMI according to WHO were utilized for assessment of overweight and obesity (WHO 2000).

Body Mass Index (Kg/m ²)	Nutritional status
<16.00	Chronic Energy Deficiency Grade III (CED III)
16.00-16.99	Chronic Energy Deficiency Grade II (CED II)
17.00-18.49	Chronic Energy Deficiency Grade I (CED I)
18.5-22.99	Normal
≥23.00	Overweight/obesity

Cut-off values for waist circumference as >80.00cm and waist-hip-ratio as 0.81 (Snehalatha et al. 2003) were used for the assessment of abdominal adiposity.

RESULTS

Among breast cancer patients, 20 females were of pre-menopausal and 40 were of post-menopausal status. Among esophageal cancer patients all women were of post-menopausal status and had squamous cell carcinoma. The distribution of Breast cancer and Esophageal cancer patients of the present study according to BMI Classification has been presented in table 1. Among pre-menopausal breast cancer patients, 3(15.0%) were underweight, 08(40%) were normal and 09(45.0%) were overweight/obese. Among post-menopausal breast cancer patients 2(5.0%) were underweight, 11(27.50%) were normal and 27(67.50%) were overweight/obese. On the other hand, out of 40 post-menopausal esophagus cancer patients, 18(45.0%) were underweight and 13(32.50%) were normal while only 9(22.50%) were overweight/obese. Among the breast cancer patients, only 5 patients were underweight; of these 4 patients (6.67%) were in the category of Chronic Energy Deficiency Grade I (CED I) or mildly undernourished, while 1(1.7%) was in CED II. But among esophageal cancer patients, there were 18 underweight patients, of these 9 patients (22.50%) fell in the category of CED I, while 5(12.5%) were in CED II and 4(10.0%) were in CED III category.

Table 1: Classification of breast and esophageal cancer patients according to Body Mass Index (BMI)

BMI Kg/m ²	Breast cancer patients (N=60*)		Esophageal cancer patients (N=40)	Nutritional status
	Percentage prevalence		Percentage prevalence	
	Pre- menopausal (N=20)	Post- menopausal (N=40)	Post- menopausal (N=40)	
<16.00	-	-	10 (4)	CED Grade III
16.00-16.99	5 (1)	-	12.5 (5)	CED Grade II
17.00-18.49	10 (2)	5 (2)	22.5 (9)	CED Grade I
18.5-22.99	40 (8)	27.5 (11)	32.5 (13)	Normal
≥ 23.0	45 (9)	67.5 (27)	22.5 (9)	Overweight/Obese
	Mean BMI - 23.85 Kg/m ²	Mean BMI - 24.87 Kg/m ²	Mean BMI - 19.81 Kg/m ²	

*Figures in parentheses indicate number of subjects.

Table 2: Percentage prevalence of abdominal obesity in breast and esophageal cancer patients

Variable	Breast cancer patients(N=60*)				Esophageal cancer patients(N=40*)	
	Pre-menopausal(N=20)		Post-menopausal(N=40)		Post-menopausal(N=40)	
	Normal	Obese	Normal	Obese	Normal	Obese
WC	25.0 (N=5)	75.0 (N=15)	22.5 (N=09)	77.5 (N=31)	60.0 (N=24)	40.0 (N=16)
WHR	5.0 (N=01)	95.0 (N=19)	2.5 (N=01)	97.50 (N=39)	15.0 (N=6)	85.0 (N=34)

*Figures in parentheses indicate number of subjects.

The mean value of WC of pre-menopausal breast cancer patients was 84.23 cm while for post-menopausal was 89.11cm and the mean value of WHR for both pre-menopausal and post-menopausal breast cancer patients was 0.90. The percentage prevalence of abdominal obesity according to WC and WHR was 75% and 95%, respectively for pre-menopausal but it was 77.5% and 97.5% respectively for post-menopausal breast cancer patients. The mean value of WC and WHR for esophageal cancer patients was 74.71cm and 0.86, respectively. Among esophageal cancer patients, the percentage prevalence of abdominal obesity was 40.0% and 85% respectively according to WC and WHR (Table 2).

DISCUSSION

Obesity and CED have been considered the two ends of malnutrition. BMI assess both undernutrition and overweight. In the present study sample, the mean value of BMI of pre-

menopausal breast cancer patients was 23.85 kg/m² and post-menopausal was 24.87 kg/m², which was higher than the mean value reported for Punjabi women i.e. 22.9 kg/m² and national average of 20.5 kg/m². But among esophageal cancer patients, the mean value of BMI was 19.81 kg/m², which was quite less than the mean value of Punjabi women and national average (NFHS-3 2007).

In the present study, percentage prevalence of overweight/ obesity (BMI ≥ 23.0) in breast cancer patients was 45.0% in pre-menopausal and 67.50% in post-menopausal women which was more than the other studies (Bergstrom et al. 2001; Calle et al. 2003; Boyle et al. 2003; Calle and Kaaks 2004), where percentage prevalence of breast cancer attributed to overweight/ obesity (BMI ≥ 25.0) patients was in 9% in post-menopausal women. While comparing the prevalence rate of overweight and obesity among breast cancer and esophageal cancer patients of Amritsar, it was apparent from the present data that breast cancer patients showed a higher prevalence rate of

overweight /obesity than the esophagus cancer patients. Percentage prevalence of esophageal cancer squamous cell carcinoma attributed to overweight/ obesity (BMI $\geq$ 23.0) in the present study was 22.50% which was less than the studies reported from the well developed countries (Bergstrom et al. 2001; Calle et al. 2003; Boyle et al. 2003; Calle and Kaaks 2004) where percentage prevalence of esophageal adenocarcinoma attributed to overweight/ obesity (BMI $\geq$ 25.0) patients was 37.0%.

A longitudinal study in Tamil Nadu population (Cherian et al. 2007), observed that squamous cell carcinoma of esophagus was the most common type of esophageal cancer in Indian subcontinent. In the present study, the squamous cell carcinoma of esophagus patients showed higher prevalence of undernutrition as 57.5% were suffering from various grades of undernutrition. The prevalence of CED I (mild undernutrition) was quite high in esophageal patients than the CED II (moderate undernutrition) and CED III (severe undernutrition). Thus, the prevalence of undernutrition was quite high among esophageal cancer patients of Amritsar as compared to 18.9% prevalence reported in women in Punjab and 35.6% in India as whole (NFHS-3 2007). It can be concluded from the present study that the rates of overweight/obesity according to BMI in breast cancer patients were more as compared to those observed in esophageal cancer patients, but the rate of underweight were more in esophageal cancer patients than in the breast cancer patients.

According to criterion of WC and WHR to assess abdominal obesity for Asian Indians (Snehalatha et al. 2003), the percentage prevalence of abdominal obesity in premenopausal and postmenopausal breast cancer patients in the present study according to WC was 25% and 75% respectively, while according to WHR was 95% and 97.5% respectively. Among esophageal cancer patients, according to WC values 40% patients had abdominal obesity and 85% had according to WHR (Table 2). Thus, the prevalence of abdominal obesity calculated with the help of WC and WHR was higher than the prevalence calculated with the help of BMI. This meant that abdominal obesity could be present even in the absence of general obesity i.e., abdominal obesity does not always go hand- in-hand with general obesity. Various scientists (Mishra et al. 2002; Vikram et al. 2003) have also reported that WC and WHR provide different information about

obesity as WC gives information on abdominal obesity whereas WHR on regional distribution of fat.

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