

Dietary Risk with Other Risk Factors of Breast Cancer

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Abstract

Breast cancer is one of the most common and feared cancers. The incidence of breast cancer is persistently on the rise due to urbanization and lifestyle changes. Breast cancer cannot be prevented fully but can be effectively treated and controlled if risk factors are determined accurately. Detection of breast cancer at an early stage along with the advancement in treatment options has provided a greater chance of survival. **Objectives:** The objective of the study was (a) To determine the most common risk factors of breast cancer in women and (b) to identify the risk ratio of dietary risk factors among breast cancer patients. **Methodology:** A hospital-based case-control study was conducted at a tertiary care center in coastal Karnataka, India. **Results:** Total 240 participants were included in the study, 120 cases and 120 controls, who were matched by ± 2 -year age range. All the study participants were between 34 and 70 years of age group; the occurrence of breast cancer was found more among females within the normal range of body mass index and with a history of breast cancer among first-degree relatives. A statistically significant association was found with consumption of red meat, fatty food consumption, and bad dietary habit. **Conclusion:** High fat-low fiber diet is the most important risk factor for breast Cancer.

Keywords: Breast cancer, diet, lifestyle, risk factors

INTRODUCTION

Breast cancer is the second most common cancer in women worldwide and the most common cancer among women in India surpassing cervical cancer.^[1] Risk factors are anything that increases the chance of developing a disease. In the case of breast cancer, all women are at risk for breast cancer, with an increase in age. Studies have shown that reproductive factors and several lifestyle-related factors^[2] increase the risk of breast cancer.^[3] Some studies have also shown that breast cancer is hereditary. Risk factors such as female gender, age, previous breast disease, family history/genetic risk factors, early age of menarche, late age of menopause, late age of first full-term pregnancy, postmenopausal obesity, lack of physical activity, and exposure to high-dose radiation are considered as established risk factors. Breast cancer cannot be fully prevented, but it can be effectively treated and even cured if detected early. With effective methods to identify risk factors and prevent the disease, both incidence and mortality due to breast cancer could be reduced. The risk factor identification has always been a challenge in breast cancer; in this study, we are trying to determine the common risk factors of breast cancer and in particular identify the risk ratio of dietary risk factors among breast cancer patients.

METHODOLOGY

A case-control method to understand the profiles of breast cancers and risk factors was carried out. A known risk factor to be 30% in the control group and an anticipated odds ratio (OR) to be 2, a sample size of 240 was calculated using Statcal tool of Epi Info software and with the allocation ratio 1:1.

The cases were all female patients between the age group of 30–69 years who were histopathologically confirmed with breast cancer and who attended the hospital or who were diagnosed during the past 6 months. Patients with serious illness and patients presented with recurrence of breast cancer were excluded from being a case in the study. Controls were ± 2 -year age-matched patients attending the hospital, for conditions other than breast cancer and from the adopted

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village. Patients with a personal history of any breast disease in the past were excluded from being control. The cases were matched with two-third of hospital and one-third of community controls. The risk factors' determination and clinical pattern of the cases was done according to standard methods. For hospital controls, the basic investigations were taken from existing records. For community control, basic investigations were carried out. The dietary risk was determined using a 7-day recall method, and the standard measurement was used for all to ask about quantity (glass/bowl). The details of fruit, vegetable, and meal intake were enquired with each participant. Raw fruit washing practices were asked separately (practice to remove pesticides and insecticides).

Data were analyzed using the SPSS software (version 18) SPSS version 18.0 (IBM SPSS Statistics, version 18.0, Armonk, NY, USA: IBM Corp.). Logistic regression analysis was used to evaluate the significant factors associated with breast cancer. Validation of the questionnaire was done, and Kappa agreement between experts was 90%. The study was presented to the institutional ethical committee, and the approval was obtained. The participants registered were contacted, and the participant's informed consent was taken before recruitment.

RESULTS

A total of 240 study participants were interviewed which comprised 120 women with breast cancer and 120 controls age matched for ± 2 years. The age of the subjects ranged from 34 years to 70 years with the mean age of 52.1 years (± 20.8) among the cases and 46.7 (± 8.4) for the controls with the maximum number of cases in age group of 41–50 years (34.2%). Both the groups had similar rate of literacy with majority of the participants studied up to tenth standard (54.2% among cases and 58.3% among controls). Maximum number of participants were housewives (63.3% of cases and 56.7% of controls). Table 1 explains the demographic profile of the cases and controls and the baseline characteristics in relation to age group, income, and occupation look similar in the cases and control, and there is no statistical significance of any association of these factors to the breast cancer.

We tried to find an association of high body mass index (BMI) with that of cancer, and it was statistically significant ($P = 0.001$) with OR of 14.57 (confidence interval [CI]: 6.76–31.49) with a high mean (23.8 and 23.6, respectively) [Table 2]. Similarly, family history was also found to be having a strong association (OR: 5.3 with CI: 2.7–10.4) with the occurrence of breast cancer ($P = 0.001$). As compared to participants who had two or more children, those who are nulliparous or had only one child had a significant association with breast cancer ($P = 0.02$) with an OR of 1.2 (1.01–1.4). Breastfeeding was found to be 63% protective against occurrence of breast cancer ($P = 0.1$).

The dietary pattern showed wide variation among cases and controls which is described in Table 2. We had taken type of breakfast, number of rice bowls per day, raw vegetables

eating, cooked green vegetable eating, and eating sweet or desert daily was considered. However, none of them had any association or there was any change in the OR in these. Nearly 62.5% of the cases preferred fatty food and it was strongly associated (OR = 4.9) with the occurrence of breast cancer after multivariate logistic regression analysis ($P = 0.001$). Most of the participants had nonvegetarian diet (62.5% of cases and 53.3% controls), and staple diet was rice which they consumed <3 bowls per day (55.8% of cases and 50.8% of controls). Amount of raw vegetable intake in the form of salads was low among both the cases and controls, which constitutes 47.5% and 44.2%, respectively. An interesting association between fruit intake and breast cancer was found, especially among those consuming fruits without washing on a daily basis (60.8% of cases). Initially, in the study for first forty samples, it was taken as a raw fruit, later on, suspicion we asked about the washing practices to the rest of the sample population to understand the washing practices. Hence, we considered that all 240 without proper washing practices (not just washing with water but using baking, soda etc., to remove insecticides or pesticides). Nearly 52.5% of cases had no dietary control and were found to have a strong association (OR = 2.1) with breast cancer occurrence ($P = 0.04$). Consumption of green leafy vegetables was very low among the cases with the majority of them consuming it <2 times per week (45.8%). However, the consumption among the controls was better with the majority of them taking it at the frequency of 3–4 times per week (41.7%). On considering the consumption of individual food items, red meat and fish were taken more frequently, at least 5 times a week among both cases (41.7% and 74.2%) and controls (33.3% and 75%), respectively. Nearly 36.7% of cases and 28.3% of controls consumed pickle on a daily basis. We observed a higher level of green tea drinking among both the cases and controls, where the majority of them had taken it more than 5 times a week. After multivariate logistic regression analysis, it was observed that there is a statistically significant association with the consumption of red meat (OR = 2.2, $P = 0.04$), green tea (OR = 2.03, $P = 0.01$), fatty food (OR = 4.9, $P = 0.001$), and bad dietary habit (OR = 2.1, $P = 0.04$).

DISCUSSION

The present study was conducted at a tertiary care hospital at coastal Karnataka and included breast cancer cases who had undergone treatment and who fit the inclusion criteria. The age of the patients ranged from 32 to 76 years, and the maximum number of patients were in the age group of 41–50 years (34%). High prevalence of breast cancer in this age group was reported in previous studies by earlier studies^[4] in Indian population. The mean age of the participants when surveyed was 48.6 years. Approximately 50% of Asian women^[5] were <50 years when diagnosed with breast cancer, and Surakasula *et al.*^[6] reported the average age of women at diagnosis was 47.7 years. On the contrary, breast cancer incidence in western women <50 years

Table 1: Demographic factors and common risk factors of breast cancer (n=240)

	Cases, n (%)	Controls, n (%)	OR (CI)	Univariate analysis P	Multivariate analysis P
Age (years)					
31-40	19 (15.8)	27 (22.5)	0.6 (0.49-0.8)	0.14	0.27
41-50	41 (34.2)	55 (45.8)			
51-60	27 (22.5)	26 (21.7)			
>60	33 (27.5)	12 (10)			
Education					
Illiterate	32 (26.7)	27 (22.5)	1.04 (0.75-1.4)	0.79	0.81
10 th standard	65 (54.2)	70 (58.3)			
PUC	15 (12.5)	17 (14.2)			
Profession degree	8 (6.7)	6 (5)			
Occupation					
Homemaker	76 (63.3)	56 (46.7)	1.1 (0.8-1.5)	0.01	0.4
Sedentary worker	18 (15)	47 (39.2)			
Moderate worker	22 (18.3)	14 (11.7)			
Heavy worker	4 (3.3)	3 (2.5)			
Age of first pregnancy	20.1 (1.9)	21.2 (1.8)	0.534 (0.18-1.54)	0.01	0.241
Age of menarche (years)					
≤13	55 (45.8)	29 (24.2)	1.2 (0.7-2.3)	0.76	0.56
14-15	41 (34.2)	52 (43.3)			
16+	24 (20)	39 (32.5)			
Family history					
Present	47 (38.2)	13 (10.8)	5.3 (2.7-10.4)	0.01	0.001
Absent	73 (61.8)	107 (89.2)			
Number of children					
0	18 (15)	9 (7.5)	1.2 (1.01-1.4)	0.0007	0.001
1	41 (34.2)	25 (20.8)			
2	29 (24.2)	36 (30)			
≥3	32 (26.6)	50 (41.7)			
Average months of breastfeeding					
1-5	59 (27.8)	15 (13.5)	0.33 (0.14-0.77)	0.01	0.011
6-11	26 (25.4)	50 (45)			
≥12	17 (16.6)	46 (41.4)			
Missing	18	9			
BMI (mean±SD)	23.8±4.2	23.6±3.9	14.57 (6.76-31.49)	0.01	0.0001

OR: Odds ratio, CI: Confidence interval, BMI: Body mass index

was only 23%,^[7] this slight variation in the age of diagnosis could be due to the difference in culture or breast cancer knowledge among women which could have resulted in early or late diagnosis. Women in the present study were predominantly housewives (73.7%), married, diagnosed with invasive ductal (69%) breast cancer, undergone mastectomy, and received adjuvant treatment (e.g., chemotherapy, radiation). These demographic characteristics were similar to samples from other published studies on breast cancer survivors.^[8,9] In this study, known factors such as parity (58%), breast feeding at least one child for minimum 6 months (81%), and pregnancy were protective like earlier studies.^[10] In this study, it was found that family history is a significant risk factor, similar to other epidemiologic studies, with first-degree relatives having cancer.^[11,12] It was seen that average BMI in this study was 23.8, and according to data of BCSC,^[12] the occurrence of breast cancer is more among females within normal range of BMI.

Diet has long been hypothesized to be one of the primary reasons for the observed differences in breast cancer rates between countries, with fat intake the component most often thought responsible for the differences. The present study revealed that a preference for fatty foods is a strong risk factor for breast cancer with an OR of 4.9, which supports the findings of earlier studies^[13] that saturated fats are a risk factor for breast cancer. The frequency of vegetable and fruit consumption on almost every day was higher in patients with breast cancer compared to controls in this study. This study adds further evidence that intake of the raw fruits without treatment is a significant risk factor,^[14] which can be attributed to its pesticide content, especially organochlorines, as revealed in international studies.^[15] A significant association was found between the increased frequency of meat consumption and the occurrence of breast cancer with an adjusted OR of 2.2 similar to study^[16] in Kerala where breast cancer was associated with nonvegetarian diet.

Table 2: Association of dietary risk factors with breast cancer (n=240)

Variables	Groups	Cases, n (%)	Controls, n (%)	OR (CI)	Univariate analysis P	Multivariate analysis P
Salt	Dislike	69 (57.5)	47 (39.2)	2 (0.08-0.5)	0.007	0.02
	Like	51 (42.5)	73 (60.8)			
Fatty food	Not preferred	45 (37.5)	75 (62.5)	4.9 (2.2-11.4)	0.01	0.001
	Preferred	75 (62.5)	45 (37.5)			
Type of breakfast	Bread	4 (3.3)	5 (4.2)	1.3 (0.84-1.96)	0.9	0.24
	Rice	32 (26.7)	30 (33.3)			
	Skip	9 (7.5)	11 (9.2)			
	Mixed	75	64 (53.3)			
Number of rice bowls per day	<3	67 (55.8)	61 (50.8)	1.1 (0.5-2.5)	0.43	0.73
	≤3	53 (44.2)	59 (49.2)			
Milk	Daily	59 (49.2)	56 (49.7)	1.02 (0.46-2.7)	0.7	0.95
	Occasional	61 (50.8)	64 (53.3)			
Raw vegetables	≤4/week	63 (52.5)	67 (55.8)	1.37 (0.5-3.3)	0.6	0.48
	Daily	57 (47.5)	53 (44.2)			
Fruits*	≤4/week	47 (39.2)	64 (53.3)	2.48 (1.1-5.4)	0.03	0.02
	Daily	73 (60.8)	56 (46.7)			
Sweet dessert	Daily	40 (33.3)	42 (35)	2.2 (0.9-5.2)	0.07	0.18
	Occasional	80 (66.7)	78 (65)			
Dietary habit [#]	Bad	63 (52.5)	37 (30.88)	2.1 (1.1-4.3)	0.01	0.04
	Good	57 (47.5)	83 (69.2)			
Green vegetables Cooked	<2/weeks	55 (45.8)	44 (36.7)	0.94 (0.5-1.6)	0.15	0.8
	3-4 weeks	34 (28.3)	50 (41.7)			
	>5/weeks	31 (25.8)	26 (21.7)			
Carrot	<2/weeks	57 (47.5)	46 (38.3)	0.15 (0.9-2.4)	0.16	0.18
	3-4 weeks	30 (25)	30 (25)			
	>5/weeks	33 (27.5)	44 (36.7)			
Potato	<2/weeks	42 (35)	35 (29.2)	1.2 (0.7-1.8)	0.33	0.52
	3-4 weeks	34 (28.3)	33 (27.5)			
	>5/weeks	44 (36.7)	52 (43.3)			
Egg	<2/weeks	25 (20.8)	38 (31.7)	0.89 (0.54-1.4)	0.56	0.65
	3-4/weeks	46 (38.3)	36 (30)			
	>5/weeks	49 (40.8)	46 (38.3)			
Meat	<2/weeks	32 (26.7)	40 (33.3)	2.2 (1.3-3.8)	0.26	0.04
	3-4/weeks	38 (31.7)	40 (33.3)			
	>5/weeks	50 (41.7)	40 (33.3)			
Green tea	<2/weeks	25 (20.8)	38 (31.7)	0.9 (0.6-1.2)	0.02	0.1
	3-4/weeks	41 (34.2)	33 (27.5)			
	>5/weeks	54 (45)	49 (40.8)			
Pickle	Never	31 (37.5)	20 (16.7)	1.4 (0.8-2.4)	0.01	0.2
	Occasional	45 (37.5)	66 (55)			
	Daily	44 (36.7)	34 (28.3)			
Salted fish	Dislike	31 (25.8)	30 (25)	0.88 (0.36-2.2)	0.18	0.8
	Like	89 (74.2)	90 (75)			

*Fruit- without proper washing, [#]Good dietary habit-near to balanced diet, bad dietary habit-consuming more junk foods, carbohydrates and fatty foods, $P < 0.05$, For continuous data – t -test, for categorical data–Chi-square test, for multiple variables–multiple logistic regression. OR: Odds ratio, CI: Confidence interval

CONCLUSION

The present study revealed that dietary risk factors such as excess consumption fatty foods, lack of dietary control, consumption of raw fruits without proper pretreatment, and red meat had a significant association with the occurrence of breast cancer among the study subjects. In addition, it revealed that the intake of dietary fiber in the form of vegetables and dietary control is associated with a lower risk of breast cancer.

Limitations

In this study, the information regarding dietary factors was collected by recall method, so there is no precise understanding of how the fruits and vegetables were used.

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Conflicts of interest

There are no conflicts of interest.

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