Oncology

BREAST CANCER RISK IN RELATION TO DIETARY FAT ALONG WITH SOME OTHER NUTRIENTS

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SUMMARY: To study association of dietary intake of food groups in breast cancer patients and normal subjects. The study was conducted on 148 breast cancer patients and 149 control subjects, randomly selected and distributed among six age groups and three socio-economic statuses.The subjects were selected from Shaukat Khanum Memorial Cancer Hospital, Lahore, during April to August, 2000. Intakes of various nutrients were assessed from information on past 5-8 years by food frequency questionnaire and food composition tables. The data showed that percentage of breast cancer patients was low below the age group of 25 (0.67%) and above the age group of 65 (10.13%). It was significantly higher between the age groups of 55-65 (16.9%) and 25-33 (14.2%). Most of the breast cancer cases were observed between the ages of 35-45 (26.4%) and 45-55 (31.7%) years. Breast cancer patients showed higher percentage in low (43.9%) and middle (39.9%) socio-economic statuses than the high socio-economic status. Results also revealed that dietary energy (kcal/day) was significantly higher in the age groups of 25-35 (1280) and above 65 (1207) of control subjects than breast cancer patients in which the values were 1262 and 1192 kcal/day, respectively. Differences in the intake of dietary proteins and fats among various age groups of breast cancer patients and controls were non-significant. However, intake of carbohydrate (g/day) was significantly more above the age group of 65 in controls (196.83) as compared to breast cancer patients (185.85). While, all other age groups showed non-significant differences. The percentage of intake of butter (40.54%) and fried foods were found to be higher in breast cancer patients than controls (20.3%). Positive correlation was observed between dietary fats and carbohydrate (g/day) in all age groups of breast cancer patients and controls except above 65 years of age group in controls which showed negative correlation between these nutrients. Fats (g/day) and protein also showed positive correlation in all age groups of breast cancer patients and controls. The intakes of nutrients (fats, proteins, carbohydrates) have not been found to contribute to the risk of breast cancer together with family history, breast feeding, contraceptives and menstrual abnormalities.

Key Words: Breast cancer, dietary fats.

INTRODUCTION

Breast cancer has continued to be a major cause of morbidity and mortality among women all over the world.

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Among others, changes in diet seem to be an important prevention strategy to reduce the incidence of breast cancer. A relationship has been established between cancer and a high fat diet, the latter has been found to be associated with an increased risk of breast cancer. A diet high in fibre, conversely, seems to have a preventive influence on this disease. Vitamin A, beta-carotenes and vita-

Table 1 : Food composition tables of food exchange groups (single serving).

No.	Group	CHO (g)	Protein (g)	Fat (g)	Calories
1	Vegetables	5	2	-	35
2	Fruits	10	-	-	40
3	Oz-meat	-	7	5	75
4	Rice	15	2	<1	70
5	Milk	12	8	10	170
6	Bread	15	2	-	70
7	1 tea-spoon full	-	-	5	45

mins C and E which act as antioxidant agents may help to protect cells from becoming malignant (3).

The dominant diet breast cancer hypothesis has ascertained that high fat intake can increase breast cancer risk (6) and fat diets rich in polyunsaturated fatty acids tend to be more effective tumor promoters than high fat diets rich in saturated fatty acids. Nearly 100.000 new cases of cancer have been estimated to occur each year in Pakistan and the estimated ratio of breast cancer was 26.1%, showing breast cancer to be the most common malignancy in Pakistani females (15). Therefore, present study was conducted to investigate relationship between risk of developing breast cancer and the dietary intake of indigenous fatty foods being taken so commonly by the local women these days.

MATERIALS AND METHODS

Selection of subjects

A total of 148 histopathologically proven breast cancer patients were randomly selected from all the departments of Shaukat Khanum Memorial Cancer Hospital, Lahore. Another 149 subjects who were family attendants of the patients were included in the study to form the control group. After recording their height and weights, the patients and control subjects were interviewed.

Dietary assessment method

Information on past (5-8 years) diet was obtained by using a food frequency questionnaire structured by the Data Processing Unit of the hospital. It included all food groups, i.e., vegetables, fruits, meat, milk, cereals, fats and oils. For each food group, a series of food items was listed for each of which the usual portion size (small, medium or large) defined by weight or by common household measures was taken at weekly frequency. Specific questions regarding fatty foods and use of animal butter were asked from the subjects to observe the level of fat intakes in breast cancer patients and control females. The questionnaire also included socio-demographic data, such as age, place of dwelling, occupation, education, marital status and questions on reproductive history and other factors possibly related to breast cancer.

Dietary calculations

The nutrient (fats, proteins and carbohydrates) intakes were calculated on the basis of food composition tables (Table 1) of food exchange groups (8). Composition of fat, protein and carbohydrate in grams and kilo-calories was worked out by multiplying the number of servings by grams and Kcal present in each serving, respectively.

Determination of percentage of calories

The percentage of calories contributed by carbohydrates, proteins and fats were determined by the following formula as below:

$$= \frac{g \text{ of macronutrient} \times kcal \text{ produced by } 1g \text{ of macronutrient}}{\text{Total calories}} \times 100$$

Statistical analysis

The data were fed to the computerized database in SAS ver. 6.12 for analysis (SAS, 1996). Student's t test was used to

Table 2 : Distribution of breast cancer patients and control subjects according to age and socio-economic status.

Age groups	Control subjects	Breast cancer patients (%)
Below 25	26.17	0.67 (1)
25–35	20.13	14.2 (21)
35–45	34.9	26.4 (39)
45–55	10.7	31.7 (47)
55–65	6.04	16.9 (25)
Above 65	2.01	10.13 (15)
Socio-economic statuses		
Low	44.96%	43.9
Middle	41.6%	39.9
High	13.4%	16.2

compare the means of quantitative variables between two groups for their possible significance. The Pearson's correlation coefficient was worked out among different parameters. Values have been presented in mean± SEM format.

RESULTS

Distribution of the breast cancer patients

The percentage of breast cancer patients below the age of 25 and above 65 years was low while it was comparatively higher between the ages of 35-45 and 45-65.

Most of the breast cases were observed between ages of 25 and 65 years. It was found that percentage of breast cancer patients were higher in low and middle socio-economic statuses than high socio-economic status (Table 2).

Dietary energy intake

Intakes of dietary energy in breast cancer patients and controls were 1246.6 ± 32.49 and 1255.2 ± 27.5, respectively. It was significantly higher ($p<0.05$) in the 25-35 and above 65 years age group (Table 3).

Table 3 : Mean±SEM intake of dietary energy (kcal/day) in breast cancer patients and control subjects of various age groups.

Age groups	Control subjects	Breast cancer patients
Below 25	1230±48	799±21
25–35	1280±60*	1262±78
35–45	1177±52[NS]	1367±82
45–55	1643±54[NS]	1190±52
55–65	1052±91[NS]	1201±62
Above 65	1207±127*	1192±71
Overall mean±SEM	1255±27	1246±32

  * : N.B. Significant at $p < 0.05$

NS : Non-significant at $p > 0.05$

Table 4 : Mean±SEM intake of dietary protein on g/day and percentage/day basis in breast cancer patients and control subjects of various age groups.

Age groups	Control subjects	Breast cancer patients
g/day		
Below 25	17.05±0.50	16.36±0.43
25–35	16.39±0.58[NS]	16.94±0.53
35–45	17.53±0.71[NS]	16.67±0.75
45–55	15.07±0.75[NS]	16.82±0.38
55–65	16.03±0.69[NS]	16.78±0.48
Above 65	13.90±0.36[NS]	15.53±0.75
Overall mean±SEM	16.75±0.32	16.66±0.25
Percentage/day		
Below 25	52.50±2.57	32.700
25–35	56.56±4.22[NS]	52.520±3.32
35–45	51.12±2.62[NS]	63.34±7.70
45–55	44.45±3.23[NS]	51.86±2.30
55–65	41.34±3.70[NS]	50.76±3.23
Above 65	42.30±5.12[NS]	47.27±4.06
Overall mean±SEM	51.098±1.5	54.20±2.34

* : N.B. Significant at $p < 0.05$

NS : Non-significant at $p > 0.05$

Dietary protein

Intakes of dietary proteins in breast cancer patients and controls were 54.20 ± 2.34 and 51.098 ± 1.50, respectively. On percentage/day basis they were 16.66 ± 0.26 and 16.75 ± 0.32, respectively (Table 4).

Dietary carbohydrates

Intake of dietary carbohydrates in breast cancer patients and control subjects were 188.48 ± 4.3, 187.11 ± 4.10, respectively. The value was significant ($p<0.05$) in control subjects above 65 years of age against breast cancer patients. While, all other age groups revealed non-significant results. On percentage basis, they were 61.82 and 63.09%, respectively. The value was significant ($p<0.05$) in the age group of 25-35 years in control subjects as compared to breast cancer patients. Other age groups showed non-significant results (Table 5).

Dietary fats

Intake of dietary fats in breast cancer patients and control subjects were 27.39 and 25.64, respectively. However, results among various age groups of breast cancer patients and control subjects were non-significant. On percentage basis, it was 19.32 and 18.48 in breast patients and control subjects, respectively and showed more significant ($p<0.05$) difference in patients of 25-35 and 35-45 years old age groups than the control subjects (Table 6).

Table 5 : Mean±SEM intake of dietary carbohydrates on g/day and percentage/day basis in breast cancer patients and control subjects of various age groups.

Age groups	Control subjects	Breats cancer patients
g/day		
Below 25	195±8	139±8
25–35	197±9[NS]	195±12
35–45	181±7[NS]	195±8
45–55	175±6[NS]	184±7
55–65	164±13[NS]	181±10
Above 65	196±21*	185±8
Overall mean±SEM	187±4	188±4
Percentage/day		
Below 25	63.5±1.6	69.7±1.0
25–35	62.4±1.6	62.22±1.4
35–45	61.99±1.37*	61.43±1.80
45–55	66.95±2.13[NS]	62.24±1.25
55–65	62.47±2.66[NS]	60.13±1.60
Above 65	65.0±1.48[NS]	63.25±2.08
Overall mean±SEM	63.09±0.77	61.82±0.73

* : N.B. Significant at $p < 0.05$

NS : Non-significant at $p > 0.05$

Percentage of animal butter intake was found to be higher in breast cancer patients than control subjects. In addition breast cancer patients showed higher intakes of fried foods than control subjects (Table 7).

Relationship between various parameters

The relationship of fats and carbohydrates on g/day basis was significant ($p < 0.05$) and positive in cancer patients of all age groups except 35-45 years of age, while on percentage per day basis it was non-significant and negative in all age groups.

Relationship of fats with protein intake was non-significant on g/day basis in cancer patients, while it was posi-tive and significant ($p < 0.05$) in patients of 35-45 (r= 0.213) and 45-55 (r = 0.166) age groups.

Relationship of carbohydrates with proteins intake on g/day basis was significant ($p < 0.05$) and positive in patients of 35-45 (r = 0.263) years age group, while on percentage/day basis, it was negative and non-significant in almost all age groups.

Risk factors

Family history including breast feeding practices, contraceptive usage and menstruation problems were not found to be associated with occurrence of cancer (Table 8).

Table 6 : Mean±SEM intake of dietary fats on g/day and percentage/day basis in breast cancer patients and control subjects of various age groups.

Age groups	Control subjects	Breast cancer patients
g/day		
Below 25	25.325±2.12	9.28
25–35	28.92±2.31[NS]	26.99±2.17
35–45	26.0±1.87[NS]	28.46±2.67
45–55	21.46±3.12[NS]	27.43±2.01
55–65	22.53±3.90[NS]	27.85±2.43
Above 65	22.56±2.45[NS]	25.52±3.07
Overall mean±SEM	25.64±1.06	27.39±1.120
Percentage/day		
Below 25	17.51±1.23	10.440 (1)
25–35	19.78±1.31*	19.70±1.28
35–45	19.22±1.08*	18.90±1.28
45–55	16.17±1.71[NS]	18.90±1.038
55–65	18.70±2.45[NS]	21.07±1.30
Above 65	17.03±2.30[NS]	18.79±1.62
Overall mean±SEM	18.48±0.61	19.316±0.57

  * : N.B. Significant at $p < 0.05$

NS : Non-significant at $p > 0.05$

DISCUSSION

Current guidelines of the American Cancer Society (1) have advised the females about dietary practices which could reduce breast cancer risk. These guidelines were developed by expert advisory committees and based on existing scientific evidence that relates diet and nutrition to cancer risk in human population studies as well as in laboratory experiments. Many dietary factors can affect breast cancer risk, types of foods, food preparation methods, portion sizes, food variety and overall calorie balance. Breast cancer risk can be reduced by an overall dietary pattern that includes a high proportion of plant foods (fruits, vegetables, grains and beans), limited amounts of meat, dairy and other high fat foods and balance of calorie intake.

The present study showed that the women consuming >2.700 kcal/day had a greater risk for developing breast cancer with those consuming <1900 kcal/day. The dietary energy intakes observed in this study were almost in line with earlier findings (2). Finding of the present study showed that mean intake of dietary energy (kcal/day) was significantly higher in two age groups (25-35 and >65 years) of control subjects as compared to breast cancer patients. The under estimation of mean energy intake at the groups level was not unexpected as it occurred commonly with history questionnaire (7).

The mean carbohydrates intake (g and percentage/day) in breast cancer patients and controls were 188, 187 and 62, 63, respectively. Carbohydrate intake was

Table 7: Percentage of animal butter and fried food intakes among breast cancer patients and control subjects.

	Variable	Never (%)	Occasianolly (%)	Very often (%)
In breast patients	Animal butter	28.4	31.08	40.54
	Fried foods	10.8	68.9	20.3
In control subjects	Animal butter	34.2	30.9	34.8
	Fried foods	12.7	71.8	15.5

significantly higher in two age groups (25-35 and 35-45 years) in control subjects than breast cancer patients. However, these intakes were found to be lower when compared with other studies in which the carbohydrate intake was reported to be 259 and 254 g/day in patients and controls, respectively (2). Overall results showed that carbohydrates were the major energy contributor in calories in both patients and controls.

An important aspect in the design of present study was the attempt to maximize comparability between cancer cases and controls. When the intake of nutrients was considered, cases and controls reported substantially similar intake of dietary fats and proteins. Mean dietary fat intakes in breast cancer patients and control subjects showed statistically non-significant difference in all age groups of the patients and controls but very often percentage intake of animal butter, paratha and fried foods were found to be higher in breast cancer patients than controls. Our values for fats intake were lower than as reported by Paolo et al. (2) who have suggested that reduction in the consumption of total fats to <30% to saturated to <10% or of animal proteins to <6% might be strongly protective against breast cancer. Nevertheless,

some workers found no evidence that lower intakes of total fats or particular types of fat over 14 years of follow-up were associated with a decreased risk of breast cancer (9). These findings suggest that reduction in total fat intake during midlife is unlikely to prevent breast cancer and should receive less emphasis.

Positive relationship observed between energy providing nutrients, i.e., dietary fats and carbohydrates in all age groups of breast cancer patients and control subjects except above 65 years age group in control subjects which showed negative relationship between these nutrients. Fats and proteins also showed positive relationship in all age groups of breast cancer patients and in the control subjects.

Breast cancer was most prevalent in the age group, 45-55 years (31.7%) and it was found very low below 25 years of age (0.67%). The rates of this malignancy were found to be highest in low socio-economic group (43.9%) as compared with high socio-economic group (16.2%). Among risk factors, no protective effect was seen of late or normal age of menarche (median age 13 years) or early menopause (median age 44.5 years). Moreover, hormonal factors were not found associated with occur-

Table 8: Percentage of risk factor among breast cancer patients and control subjects.

	Family Hx of cancer		Hx of breast feeding		Hx of hormonal contraceptives		Menstrual statuses	
	(+)	(−)	(+)	(−)	Users	Non-users	Pre-menopause	Post-menopause
In breast cancer patients	63.51	36.48	90.2	9.8	18.11	81.9	40.5	59.5
In control subjects	26.8	73.15	90.0	10.0	18.4	81.6	73.8	26.17

rence of breast cancer including the non-pregnancy at the median age of 21 years and birth control pills were also not used for appreciable period. Similar results have been reported earlier (5).

CONCLUSION

It is conceivable that intake of nutrients (fats, proteins and carbohydrates) have no contribution in the risk of breast cancer in women. Moreover, family history, breast feeding practices, contraceptive usage and menstrual history have also been found to be the risk factors in causation of breast cancer.

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