

RESEARCH ARTICLE

Dietary Patterns and Risk of Breast Cancer in Women in Guilan Province, Iran

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Abstract

Background: Several studies have pointed to roles of dietary and food groups in the pathogenesis of breast cancer, but information on dietary patterns among women with breast cancer and their healthy counterparts in Iran is limited. Therefore the present investigation was conducted in Guilan province in 2014-2015. **Materials and Methods:** In a case-control study, 450 women with breast cancer and one of their relatives (third-rank) were investigated. At first the phone numbers of patients in Razi Hospital in radiotherapy and chemotherapy and oncology centers of Guilan were taken. Data were collected through telephone interviews by the researcher. The questionnaire had two parts comprising demographic clinical and food frequency data including a list of 40 food items. To analyze the variables, Chi-square test and univariate logistic regression models were used. **Results:** In each group, 225 subjects were investigated. The majority of samples in both groups of experiment and control were consumed than two glasses of milk and dairy products per day. Regarding consumption of meat and its products, 56% of the cancer group had more than three servings per day while 26.7% of the control group had less than 2 servings per day. The majority of subjects had less than six servings of cereal per day. Some 54.7% of the cancer and 62.2% of the control group consumed less than two servings of fruit per day. Consumption of vegetables in experimental and control groups were 52.9% and 76.9% respectively, more than five servings per day. There was a meaningful difference between two groups regarding the consumption of milk and dairy items (OR=0.6,95%CI= 0.4-0.9), meat and its products (OR=0.49,95%CI=0.3-0.7), bread and cereals (OR=0.4,95%CI=0.2-0.8), vegetables (OR=0.5,95%CI= 0.3-0.9). (P-value<0.05). **Conclusions:** The results of this study emphasize the importance of informing women, particularly those at higher risk of breast cancer, in relation to dietary factors.

Keywords: Breast cancer - dietary pattern - risk factors - Iran

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Introduction

Breast cancer is the most rampant cancer among women (Yaghmaei et al., 2008; Baneshi et al., 2012; Haghghat et al., 2012; Bandala et al., 2014). Now, according to international studies, the risk of this cancer is on the rise (Portoghaly et al., 2012; Tahrgoraby, 2014; Omranipour et al., 2015). This cancer is the world's second most rampant cancer after lung cancer and one third of all cancers (De Stefani et al., 2009; Paul et al., 2014). According to the World Health Organization breast cancer has increased 20% since 2008 (Zare et al., 2010).

On aggregate, every year, one million and seven hundred thousand women are diagnosed with breast cancer (Justo, Wilking et al. 2013). 21.4 percent of all reported cases of cancers in Iran are breast cancer (F, Portoghaly et al. 2012; Tahrgoraby, 2014). The risk of breast cancer is 1 in 35 (Tehrani, 2009; Fouladi et al., 2011). Studies

have shown that about seven thousand people each year are diagnosed with breast cancer in Iran (Akbari et al., 2012). This cancer is the second most rampant cancer after gastric cancer in Guilan Province and includes 8.6 percent of all cancers (Hoda, 2004). Unfortunately, breast cancer is multifactorial (Nouri, 2008; Keihanian et al., 2010). Since many risk factors for breast cancer are not easily modifiable, its preventive measures against factors that are subject to change; among which dietary factors can be named (Buck et al., 2011).

Nutrition plays an important role in maintaining health and preventing disease. A healthy diet decreases the risk of progressive diseases such as chronic diseases, especially breast cancer (Safaryan et al., 2013; Karimi et al., 2014). Dietary pattern is an idea that has recently been considered by nutritional epidemiology experts but it has not been considered as it is supposed (Karimi et al., 2014). The important thing is that evaluating dietary patterns are

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more in line with the real world because people do not consume nutrients individually, but diet includes a variety of foods with a complex mixture of minerals that may have a reaction effects on one another (Safaryan et al., 2013).

Dietary patterns reflect the interests, preferences, dietary influenced by genetic, cultural, social, health, environmental, economic and lifestyle factors. Therefore, the study of food ingredients of dietary patterns in a society is of great importance (Karimi et al., 2014). Although numerous studies have investigated the relationship

between the consumption of food (including fat, soy, dairy, meat, fruits and vegetables) breast cancer, it has not been found any conclusive evidence on the effect of diet on breast cancer risk (Tahrgoraby, 2014). The results of some ongoing studies at breast cancer research institute reflect the impact of green tea and soy proteins on reduction of breast cancer risk (Shrubsole et al., 2009; kimiagar and hegazy, 2010; Jung et al., 2013; Kruk, 2014). While the consumption of high-fat diet and red meat, salty foods and food pickled with salt and processed foods, lack of

Table 1. Food Frequency Questionnaire(FFQ)

Types of food	Components
1. Meats processed	Sausage and bacon
2. Red Meat	Beef and veal, lamb, mince and burgers
3. Organ meats	Heart and liver and kidney, tongue, brain, head and legs, tripe[1] and Abomasum
4. Fish	Type of fish
5. Poultry	Hen and Chickens
6. Egg	Egg
7. Butter	Butter, yellow oil
8. Low-fat dairy	Low-fat milk, low-fat yogurt and regular yogurt, curd
9. Fat dairy products	Whole milk, chocolate milk, chocolate milk, yogurt and fat, yogurt, cream , LighvanCheese[2], cream cheese, cottage cheese, cream, ice cream
10. Tea	Tea
11. Coffee	Coffee
12. Fruits	Cantaloupe, melon, watermelon, apricot, cherry, apple, peach, nectarine, green tomatoes, grapes, kiwi, grapefruit, oranges, persimmons, tangerines, pomegranates,bananas, apricot, red plum, cherries, strawberries, bananas, sweet lime, lemon, lime, grapes, fresh fruit, fresh pineapple, blueberries, figs,BlackBerry, compote, lemon juice, pomegranate paste, tamarind fruit bar
13. Fruit juices	Grapefruit juice, orange juice, apple juice, cantaloupe juice, syrup, sour water, fruit juice business
14. Vegetables Cole form	Any kole
15. Yellow vegetables	Carrot
16. Tomato	Tomato, red sauce, tomato paste
17. Vegetables green leaf	Spinach, lettuce
18. Marinades	Pickles, pickled, salted
19. Bean	Lentils, beans, chickpeas, faba bean, soybean, mung bean, chickpeas
20. Garlic	Garlic, shallot
21. Potato	Potato
22. French fries	French fries
23. Whole grains	Bread, bread, bread, boiled barley, wheat germ, oatmeal, bread Barley, Wheat, popcorn, corn cob
24. Refined grains	Bread, baguette bread, rice, pasta, noodles, wheat flour, halvah home, sweet bread, short cake, Euphorbia helioscopia bread, pizza dough, flour, fried and Rusks
25. Pizza	Pizza
26. Snacks	Biscuits, crackers, snacks, chips, gum and pretzels
27. Nuts	Peanuts, almonds, walnuts, pistachios, hazelnuts, any seeds and sesame
28. Mayonnaise	Mayonnaise
29. Sweets and Desserts	Donuts, crème caramel, chocolate, cakes, homemade cakes, birthday cakes, cream cakes and sweets, dry, sweet, yellow Chalet, Cauchy
30. Olives	Green olives, olive oil
31. Dried fruit	Palm, peach, apricot
32. Other Vegetables	Cucumber, vegetables, vegetable stew and soup, eggplant, celery, green peas, green beans, green peppers, bell peppers, turnips, Squash, pumpkin, mushrooms, corn and maize, onion
33. Solid oils	Hydrogenated vegetable oil, tallow, fat, animal fat
34. Liquid oils	Each type of oil (excluding olives)
35. Soup	soup
36. Condiments	Honey, jam, grape juice and dates
37. Beverage	Beverage, drink
38. Dough	Dough[3]
39. Sugar	Sugar, sugar, cheese, nougat, candy, File, Halva Sugar, cotton candy, Baklava[4], Zoolbia[5]
40. Salt	Salt

* Frequency Food studied by never, once a month or less, 2-3 times a month, 1-2/week, 3-4/week, 5-6/ week, once time/day, 2-4 times/day, 5-6 times/day; [1]. sheep's paunch prepared for food; [2]. High fat & traditional cheese; [3]. Churned sour milk ,yogurt diluted with water [4]. Kind of pastry usually cut out in lozenges; [5]. Kind of cookies

fresh vegetables and fruit are among the most important risk factors for breast cancer (Naghbi et al., 2013; Kruk, 2014; Mokhtary and Khorami Markani, 2014). It should be noted that the incidence of breast cancer in Japanese women, despite high fat intake is low. The fact is that they consume seafood fat containing omega 3 fatty (Zheng et al., 2013).

Experts pointed out that identification of dietary patterns of different nations are necessary to identify risk factors and methods of disease prevention through the necessary changes to these patterns. If nutritional interventions are designed and implemented with changes in dietary patterns, practically it will be more effective. Having identified the dietary patterns of every region, one can derive dominant patterns of dietary and improve the dietary pattern modification via nutritional advice (Safaryan et al., 2013; Karimi et al., 2014). One very important aspect of the task of nurses is focusing on disease prevention and health promotion (Ahern et al., 2014). Nurses play an important role in moderating and removal of risk factors for breast cancer because they can help through identifying risk factors, identifying people at risk in relation to prevention, education to healthy women and women suffering from breast cancer. Since many of these risk factors are modifiable their frequency can be changed at the society level through interventions. The recognition of the different regions in the country we can achieve the information that set the ground for evidence-based planning and therefore most suitable for each region at a lower cost and effectiveness (Tahrgoraby, 2014). Thus, considering the aforementioned factors into account, the researchers intended to localize factors such as nutrition, investigated the dietary pattern and risk of breast cancer in women in 2014-2105 in Guilan province, to protect and improve the women's health in the society to some extent.

Materials and Methods

In a case-control study in 2014-2015, telephone records of 262 patients with breast cancer, in chemotherapy-radiotherapy centers and medical oncology at Razi Hospital in Guilan province were collected during 6 years. Via phone call the patients with breast cancer were explained informed about the purpose of the study; questionnaires were completed by the researcher through phone call. With the attrition of 15 per cent of the number of analyzed samples, 225 patients (case) were finally enrolled. The control group was healthy women that their phone numbers were obtained from the patient. These people were not the patients' first or second-rank relatives; preferably afflicted no cancer and the age difference between two groups was ± 5 years and they were matched in terms of their age.

To collect data, questionnaire was used as the instrument. The first part included demographic data, clinical and the second part included Food Frequency Questionnaire (see Table 1). Food Frequency Questionnaire included the list of 40 food items along with the standard size of each nutrient (Safaryan et al., 2013; Karimi et al., 2014; Pasdard et al., 2014). Due to the frequency of consumption of each food item was considered for one

year, depending on the type of food in terms of frequency (once a day, 2-4 times a day, 4-5 times a day, once-twice a week, 3-4 times a week, 5-6 times a week, once a month or less, twice-three times a month and never) the values listed for each food was turned into recommended scales for the unit consumed per a day. The amounts of consumed in this study are based on a daily intake of food. To identify dietary patterns, the food items were classified into 6 groups.

Food items were grouped based on their similarity and conformity to food nutrients in Iran. 6 food groups included: Group of bread and cereals (potatoes, fries, whole grains, refined grains, and snacks), group of dairy products (low-fat and high-fat dairy and watery yogurt). Meat and its products (processed meat, red meat, organ meats, fish, poultry, eggs, nuts and legumes), vegetables (tea, vegetables, Cole shaped vegetables, yellow vegetables, tomatoes, green leafy vegetables and other vegetables and garlic), group of fruits (fruits, fruit juices and dried fruits), and miscellaneous groups (pizza, sweets, sugar, condiments, broth, butter, salt, soda, solid oil and liquid oil, coffee, olives, pickles, mayonnaise (Safaryan et al., 2013; Pasdard et al., 2014).

The 6 group of Food Pyramid used in the study upon which food groups were assessed and determined was the Food Guide Pyramid recommended by the Ministry of Health (Pasdar et al., 2014). The recommended units per day for each of the food groups were as follows: breads and cereals 6-11, fruits, 2-4, vegetables 3-5, meat and grain, 2-3 milk and dairy products 2-3, and food consumption and servings of miscellaneous groups were low (Pasdar et al., 2014). The amounts food consumed in this study was completed based on a daily intake of food. The data collected were turned in SPSS software version 22, were analyzed by using descriptive and inferential statistics. To compare the relationship between variables and breast cancer the chi-square test was used and odds ratios was calculated using Univariate logistic regression and level of meaningfulness (significance level) was considered lower level of 0.05.

Results

In women with breast cancer, the highest percentage (28 percent) age at diagnosis was 36-50 and duration of illness in 63.1% was 1-12 months also 34.2 percent of breast cancer was diagnosed before menopause. 80.9% of those seek medical service at hospital was because of a mass in the breast and diagnosing breast cancer in 55.5 percent of cases was breast self-examination.

The majority of the samples in terms of education were as follow: 42.7% of patients were pre-high school degree, 36% of control group were diploma. 67.6 % of samples in case group and 68.4% of samples in control group didn't have any medical record of heart disease. The highest rate of heart disease in 19.6 percent of case group, was internal disorders and in 19.1% of control group was cardiovascular disorders. Furthermore 70.2 percent case group and 73.3 percent of control group had no record of drug use. In this manner 10.2% of case and 12.4% of the control groups had been hospitalized due to

Table 2. Distribution of the Participants in Terms of Diet

Food intake	Frequency	Case	Percent	Control	Percent	P-value*
		(225 people) Number		(225 people) Number		
Milk and dairy products (glass)	<2 ^a	110	48.9	136	60.4	0.04
	2-3 ^b	34	15.1	26	11.6	
	>3 ^c	81	36	63	28	
Meat and beans (promise)	<2 ^a	39	17.3	60	26.7	0.001
	2-3 ^b	60	26.7	53	23.6	
	>3 ^c	126	56	55	24.4	
Bread and cereals (promise)	6> ^a	151	67.1	145	64.4	0.05
	6-11 ^b	26	11.6	43	19.1	
	>11 ^c	48	21.3	37	16.4	
Vegetables (promise)	<3 ^a	24	10.7	71	31.6	0.001
	3-5 ^b	28	12.4	35	15.6	
	>5 ^c	173	76.9	119	52.9	
Fruits (promise)	<2 ^a	123	54.7	140	62.2	0.09
	2-4 ^b	22	9.8	25	11.1	
	>4 ^c	80	35.6	60	26.7	

*Chi-square; ^a. Less than the amount recommended in the food pyramid per unit; ^b. The recommended food pyramid per unit; ^c. More than recommended in the food guide pyramid unit

Table 3. Estimated Regression Coefficients of Dietary Patterns with Breast Cancer Risk

Diet	Frequency of food intake	OR*	P-value**	CI 95%***
Milk and dairy products (glass)	<2	1.01	0.9	0.5-1.8
	2_3	0.6	0.2	0.4-0.9
	>3	1	-	-
Meat and beans (promise)	<2	0.49	0.001	0.3-0.7
	2_3	0.4	0.001	0.2-0.7
	>3	1	-	-
Bread and cereals (promise)	6>	0.4	0.02	0.2-0.8
	6_11	0.8	0.37	0.9-1.3
	>11	1	-	-
Vegetables (promise)	<3	0.5	0.03	0.3-0.9
	3_5	0.2	0.001	0.1-0.3
	>5	1	-	-
fruits (promise)	<2	1.5	0.04	1-2.2
	2_4	1.002	0.9	0.5-1.9
	>4	1	-	-

*Odd Ratio; ** P<0.05 significance level; *** Confidence interval 95%

the internal problems.

Table 2 shows the frequency distribution of the subjects in terms of diet. Of course, food consumption and servings of miscellaneous groups were low and not shown in the Table. Table 3 shows the risk of getting breast cancer and consumption of dietary patterns based on Univariate regression model. Daily consumption of 2- 3 glasses of milk and dairy in comparison with those with the consumption of more than 3 glasses of dairy products reduced the risk of breast cancer to 40 percent (OR=0.6, 95%CI= 0.4-0.9). Daily consumption of less than 6 servings of breads and cereals in comparison with those of more than 11 servings of breads and cereals reduced the risk of breast cancer to 60 percent. Furthermore, the consumption of less than 2 servings of fruit per day in comparison with consumption of more than 4 servings increases the risk of breast cancer to 1.5 times (OR=1.5,95%CI= 1-2.2).

On the other hand, there was a significant difference between two groups of consumers having less than 3 servings of vegetables per day and those of consumers

who had more than 5 servings of vegetables per day in both experimental and control groups (P-value=0.03) this reducing the breast cancer risk by 50% (OR=0.5, 95%CI= 0.3-0.9).

Discussion

The results of this study showed that in the majority of subjects the daily consumption of 2-3 glasses of milk in comparison with those with consumption of more than 3 glasses of milk and dairy, reduced the risk of breast cancer to 40 percent. (Zhang et al., 2011) indicated that consumption of milk and dairy, reduced the risk of breast cancer to 26 percent (Zhang et al., 2011). In the present study, daily consumption of less than 6 servings of breads and cereals in comparison with those with consumption of more than 11 servings of bread and cereal reduced the risk of breast cancer to 60 percent. Karimi et al in their study showed that increased consumption of bread and cereals reduced risk of breast cancer to 66 percent (Karimi et al., 2014).

In the present study, the consumption of less than 2 servings fruit in comparison with those with consumption of more than 11 servings fruit increased the risk of breast cancer to 1.5 times. Linos Willett et al. also found no meaningful relationship between breast cancer and fruit consumption (Linus et al., 2010).

On the other hand in the current study there was a statistically meaningful differences between subjects who consumed less than 3 servings of vegetables per day in comparison with those consumers had more than 5 servings of vegetables per day in two groups, namely, control and experimental that lead to the reduction of breast cancer risk to 50 percent. The results showed that the consumption of vegetables reduces the risk of breast cancer to 74 and 66 percent (Zhang et al., 2011; Karimi et al., 2014) which was similar to present study. However, other studies found no meaningful relationship between breast cancer and vegetables intake (Linus et al., 2010; Buck et al., 2011). It should be noted that fruit and vegetables intake and high-fiber diet may reduce circulating estrogen, and folic acid found in green vegetables playing a role in the process of DNA methylation prevents gene mutation of the cells and consequently carcinogenesis (Jung et al., 2013; Karimi et al., 2014). These results can be attributed to the lack of awareness about the benefits of vegetable consumption. Low amounts of fiber and natural antioxidants activate the immune system and increase inflammation factors.

In the current study there was a statistically meaningful differences between subjects who consumed 3 (and less) servings of meat and its products per day in comparison with those consumers had more than 3 servings of meat per day in two groups, namely, control and case that lead to the reduction of breast cancer risk to 60 percent. In spite of what has been mentioned, Linos, Willett et al also found no meaningful relationship between breast cancer and meat and grain consumption (Linus et al., 2010). In two studies, consumption of red meat increases the risk of breast cancer to 5.2 and 2.2 times (Zhang et al., 2011; Reyhany, 2012). Results of study by English researchers on 3000 girls 12-years old showed that meat consumption more than 8 times a week, cause early puberty and early menstruation in the girls that are associated with an increased risk of breast cancer. The reason can be the fact that as a result of early menstruation, estrogen level that woman's body produces over a lifetime increases, yet, meat is a rich source of iron playing an important role in the prevention of anemia as iron deficiency, it should not be eliminated from the girls' diet, but it is recommended not to consume this nutrient excessively (Tahrgoraby, 2014). According to our findings, consuming more servings of fruits and vegetables, bread and cereals lowers the risk of breast cancer, instead, the consumption of meat and its products, milk and dairy products more than 2 servings per day raises the risk of breast cancer. Food groups such as meat treated with N Nitrosamines that are the source of carcinogenic compounds such as heterocyclic and polycyclic aromatic hydrocarbons increases breast tumors in animals. Also, the processes of salting, using nitrate and nitrite can have an important role in carcinogenesis.

The memory of subjects can be cited as a limitation

to this study. Another limitation of this study is that the results cannot be generalized to the whole country simply because different regions have distinct cultures, customs, climates and their own eating habits that can affect the dietary patterns of that region. Yet, the results can be generalized to the northern regions of the country.

It is recommended to evaluate the relationship between dietary patterns and breast cancer in further and future studies in order to prove a stronger relationship between cause and effect. It is suggested that divide and classify the subjects in terms of menopausal status, estrogen receptor and progesterone, smoking status, and family record of breast in order to investigate their relationship with breast cancer to reveal more details. The results of this study underlines the importance of informing women, particularly those with a higher risk of breast cancer risk in relation to risky dietary factors.

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