Nutritional and Unhealthy Behaviors in Women With and Without Breast Cancer

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Background: Breast cancer is the most common malignancy in women. Global statistics indicate increasing rates of this cancer. Nutrition, diet, and healthy behaviors are among influential factors in prevalence of breast cancer, and possibly affect its incidence through inflammatory and immune system responses.

Objectives: This study was designed to compare nutritional and unhealthy behaviors in women with and without breast cancer referred to Mahdieh Imaging Center in Hamadan in 2013.

Patients and Methods: This cross-sectional study is conducted on 232 women with r and without breast cancer referred to Mahdieh Imaging Center of Hamadan, Iran) in 2013 using random sampling method. Data were collected using nutritional and unhealthy behaviors questionnaires, and analyzed with SPSS-17 software using descriptive statistics and Mann-Whitney, independent t, and chi-square tests.

Results: The mean scores of feeding type in the patients with and without breast cancer was 56.14 and 66.25, respectively. Results obtained from data analysis showed that there was statistically significant difference between the two groups in terms of nutrition ($P < 0.001$), but no relationship was observed between breast cancer and unhealthy behaviors.

Conclusions: Given the results, improving skills, training and awareness is necessary for women and emphasis on modified diet is recommended as a non-medical option for prevention of breast cancer.

Keywords: Breast cancer; Nutrition; Lifestyle

1. Background

Breast cancer (BC) is the most common malignancy (1, 2) and the second leading cause of cancer-related mortality in women (3). Global statistics indicate increasing rate of BC incidence, especially in developing countries (4). Although BC is one of the most common cancers in women, its prevalence widely varies in different parts of the world, which could be due to differences in lifestyles, such as nutrition and unhealthy behaviors, reproductive history, or genetic history (4-7). According to estimates, there are 180,000 new cases of BC in the United States every year (8). Also, of every three women with cancer, one has BC (1). In Iran, the prevalence of BC is 1% (9). Although the incidence of breast cancer is still low comparing with Western countries (Iran, 23.65 per 100 000 and United States, 140.8 per 100 000 Caucasian women) (10), new statistics indicate increasing rates of new BC cases (11). Results of several studies indicate that genes are not the main source of chronic diseases such as BC; for instance, a study conducted on identical twins shows that the effect of genes on BC is only 20% (12), while the effect of lifestyle and environmental factors in causing chronic diseases including BC is 90-95% (13). Risk factors associated with BC can be divided into two groups: risk factors that can be modified, and risk factors that cannot. Nutrition, smoking and alcohol use are among risk factors that can be modified. Because of vast differences in breast cancer in different areas, diet is considered one of the causes of breast cancer (7, 14, 15). Changing growth factors, such as insulin, may increase the risk of BC (16). There is evidence that cancer is a preventable disease, and requires quitting smoking, restricting alcohol use, increasing intake of fruits and vegetables, limiting calorie intake, exercise, avoiding exposure to direct sunlight, minimizing red meat consumption, use of whole grains, vaccination, and frequent follow-ups (17, 18).

Moreover, according to studies, compliance with the above-mentioned can lead to longer survival of breast cancer patients (12). According to researches, there is an inverse relationship between use of liquid oils with high levels of poly-unsaturated fatty acids (PUFA) n-3 such as olive oil and BC. However, use of animal fat increases the risk of BC (19, 20). The Alcohol increases serum estrogen level and disrupts metabolism and absorption of folate, which increases risk of BC (16, 21, 22). One of the objec-

tives of the World Health Organization by 2020 is promotion of healthy lifestyle, reduction of factors harmful to people's health, including wrong nutrition and use of alcohol (23).

2. Objectives

The prevalence of cancers, particularly breast cancer is increasing, and BC can be prevented through identifying nutritional factors and modifying the diet. There is also a lack of a comprehensive study in this area. Thus, this study is designed to compare nutritional and unhealthy behaviors in women with and without BC referred to Mahdieh Imaging Center of Hamadan in 2013.

3. Patients and Methods

This cross-sectional study was conducted on 116 women with BC and 116 healthy women presenting to Mahdieh Imaging Center of Hamadan (Hamadan, Iran) from October to December 2013. After approval of the study protocol (date 20/7/2013), the permission obtained from the Research Deputy of Shahid Beheshti University of Medical Sciences was presented to the Director of Mahdieh Imaging center of Hamadan. Random sampling method was used, and subjects were selected among breast cancer patients aged 20-60 years, regular menstrual periods, no known medical conditions such as diabetes, thyroid disorders and polycystic ovary syndrome, no hormone replacement therapy and no changes in diet in the past three years. The two groups were matched for variables related to breast cancer including age, weight, body mass index (BMI) and age of menarche. Sample size was estimated of 116 individuals in each group with 95% confidence interval. Every ethical consideration was observed. Participants were informed about the purpose and methods of the study and the interested women were invited to participate in this study. Furthermore, written informed consents were obtained from these individuals. Pathologically, cancer was confirmed in one point in the breast in women with BC. Individuals without breast cancer - including those referred to Mahdieh Imaging Center for other reasons and there was no known cancer according to self-report were included in our control group. Data collection tools included demographic details, diet, and unhealthy behaviors questionnaires. The researcher-made questionnaire for nutrition includes 28 items. The subjects at first studied the directions to answer the questions, which contained some explanations about different food groups and then answered the researcher's questions. Questions included consumption of fruits, vegetables, meat, cereals, nuts and oilseeds, low-fat dairy, whole-grain bread, fish, the kind of oil including liquid oil, solid or animal fat, fast foods, white sauce, sausages, chicken wings, neck and skin, salty foods, potato chips and snacks, soda drinks, and fried foods. Answers to questions included a "daily", "weekly", "monthly" and "annual" food consumption as

well as "never" option. The items about cereals, fruits and vegetables, meat and dairy was considered as positive and taking a higher score is associated with the higher consumption of such foods and items including fat and sugar are considered as negative and their higher score represents their lower consumption. The frequency of food consumption was calculated in both groups. There were 16 items for positive diet and 12 items for negative diet. Total score was measured by considering from 4 points for daily to zero for never regarding the positive items and vice versa for the negative items. The score of zero to 33 indicated poor nutritional status, the score of 34 to 66 represented a moderately appropriate nutritional status and the score of 67 to 100 represented an appropriate nutritional status. In fact, the higher score reflected better nutritional status. Unhealthy behavior questionnaire was a researcher-made questionnaire with 8 items and 22 points. The scores were converted to 0-100, where 0-33, 34-66 and 67-100 respectively showed the low, moderate and the high risk behaviors. Content validity was used to validate this questionnaire, and retest was used to determine its reliability. Pearson's correlation coefficient using test-retest method within a 10 day interval was equal to 0.82.

Questionnaires were completed by a trained researcher through interviews. Content validity was used for validity, and test-retest was used for reliability of diet, and unhealthy behaviors questionnaires. Pearson's correlation coefficient was 0.82 for diet questionnaire, which its validity and reliability have been confirmed in various studies (24-26). Pearson's correlation coefficient was 0.9 for unhealthy behaviors questionnaire. Data were analyzed with SPSS version 17 using T-test, Chi-square test and Mann-Whitney-U test. The t-test was used to compare age, weight, body mass index, menarche age, mean scores of type of feeding, mean scores of different groups of food on the food pyramid and mean scores of type of food between the 2 groups. Mann-Whitney-U test was used to compare husband's education, education, occupation, husband's occupation, monthly income and the Chi-square test was used to compare marital status between the two groups and an $\alpha = 0.05$ was considered as the level of statistical significance.

4. Results

In this study, 116 women with BC and 116 healthy women participated. Table 1, demonstrate demographics of the subjects. There was no difference between the two groups in terms of age, weight, BMI, menarche age. The results of the current study indicated a statistically significant difference in terms of nutritional status between patients with and without BC (P < 0.001) (Table 2). The nutrition score was not less than 33 in either of the groups; it was 34-66 in 62% of people with cancer and in 34.5% of non-cancer individuals and 67-100 in 38% of patients with cancer and in 65.5% of non-cancer individuals. The mean nutritional score was 56.14 in patients with cancer

Table 1. Demographic Characteristics of the Two Groups [a]

	Breast Cancer	Non Breast Cancer	P Value
Age, y	50.07 ± 14.92	50.12 ± 6.39	0.8
Weight, kg	69.65 ± 14.05	63.60 ± 9.11	0.2
BMI, kg/m²	26.08 ± 4.84	24.52 ± 4.23	0.4
Menarche age, y	13.77 ± 2.55	13.8 ± 1.56	0.8
Education			0.35
> High school	39.5	62	
< High school	60.5	38	
Husband's education			0.09
> High school	34.5	18.5	
> High school	65.5	81.5	
Housewife	67.25	77.5	0.15
Self-employed Husband	34.5	32.8	0.62
Monthly income, Rials			0.21
< 6,000,000	65.5	60.5	
> 6,000,000	19.5	22	
Marital status			0.65
Married	53.4	58.6	
single	46.6	41.4	

[a] Data are presents as mean ± SD or percent.

Table 2. Comparison of Mean Scores of Feeding Type in the Two Groups [a,b]

Score	Breast Cancer (n = 116)	Non Breast Cancer (n = 116)
0-33	0	0
34-66	78.2	34.5
67-100	21.8	65.5
Mean ± SD	56.14 ± 7.55	66.25 ± 9.2

[a] Data are presented as Percent.
[b] P Value using t-test < 0.001.

Table 3. Comparison of Mean Scores of Different Groups of Food on the Food Pyramid in the Two Groups [a]

Food Groups	Breast Cancer (n = 116)	Non Breast Cancer (n = 116)	P Value
Cereals	11.15 ± 1.19	10.12 ± 1.21	0.01
Fruits	3.28 ± 0.515	3.56 ± 0.455	0.008
Vegetables	2.45 ± 0.554	3.37 ± 0.793	< 0.001
Meat	9.52 ± 1.02	10.75 ± 1.09	< 0.001
Dairy	8.25 ± 1.22	10.04 ± 1.03	< 0.001
Fats and pastry	1.07 ± 1.08	2.06 ± 1.08	< 0.001

[a] Data are presented as mean ± SD.

Table 4. Comparison of Mean Scores of Type of Food in the Two Groups [a]

Type of Food	Breast Cancer (n = 116)	Non Breast Cancer (n = 116)	P Value [b]
Bread	3.78 ± 0.640	3.43 ± 0.620	0.008
Wholemeal bread	2.05 ± 1.76	2.82 ± 1.21	0.008
White sauce	1.28 ± 1.12	2.75 ± 1.81	0.001
Fast foods	1.43 ± 0.89	2.42 ± 1.108	0.007
Fish	1.52 ± 0.907	2.29 ± 0.913	0.001
Cheese	1.42 ± 0.613	3.95 ± 0.928	0.001
Yogurt	2.17 ± 0.514	3.18 ± 0.802	0.001
Brains	2.201 ± 1.203	3.407 ± 0.928	0.001
Liquid and solid frying oils	10.04 ± 1.03	3.12 ± 1.82	0.001

[a] Data are presented as mean ± SD.
[b] t-test.

and 66.25 in healthy individuals. The findings indicate more appropriate nutrition in healthy people than in those with BC. The frequency of consumption of food groups based on the food pyramid is shown in Table 3. In this regard, there is a statistically significant difference between the two groups. Consumption of fruits, vegetables, meat and dairy was significantly higher in healthy people than in patients with cancer, but consumption of cereals, fat and pastry was higher in people with cancer than in healthy people. The frequency of food consumption in both groups is shown in Table 4. There was a statistically significant difference between the two groups in terms of the type of food. In terms of food, consumption of whole wheat bread, fish, cheese, yogurt and nuts was higher in healthy people than in patients with BC, but consumption of fast food, white sauce, rice and liquid and solid frying oil was higher in patients with cancer than in healthy people.

5. Discussion

The analysis of the data showed a significant relationship between BC and inappropriate diet (P < 0.001) and the findings indicate more inappropriate nutrition in BC than in those with healthy people. Also the results of this study showed insignificant differences in terms of diet, food groups and the type of food used among BC patients and non- BC individuals (P < 0.001), which represents the effect of diet on BC, but no relationship was observed between BC and unhealthy behaviors. The results of previous studies also show the relationship between diet and BC (24), which is consistent with our findings. In our study, consumption of fruits and vegetables was higher in healthy people than in patients with cancer. The results of previous studies indicate that elevated fruit and vegetable consumption reduces BC risk (25, 26). Fruits and vegetables have been reported to reduce the rate of breast cancer. The survival rate is higher in people who use more fruits and vegetables.

Also, survival of people who use fruits and vegetables five or more times during a week is higher than those who eat fruits less than five times (21, 25, 27-29). Vegetable consumption decreased 6% of the breast cancer risk and fruit consumption was associated with 12% decrease (30). The direct relationship between receiving folate and reduction in BC has been reported. This reduction was higher in women with a high intake of vitamin B6 and vitamin B12 (31). Also receiving high levels of folate has a protective role against BC (32) and may be associated with lower risk of BC among moderate to high alcohol-drinkers (31). Folate is one of the B vitamins that exists in many food sources especially in dark green vegetables, fruits, liver, potato, dairy, bread and cereals (32, 33) and among food sources, fruits and vegetables are rich sources of folate (30). The relationship of folate intake, and fruit and vegetable consumption with reduction in BC risk has been raised. This may be attributed to the effect of folate in vegetables (21, 34, 35). In the current research, the rate of meat and dairy consumption was higher in healthy people than in patients with cancer. Fung et al. found that meat and dairy consumption in premenopausal ages is associated with increased risk of BC (30), which is contrary to our findings. Also the direct relationship between receiving carbohydrate and BC has been suggested (36), which is consistent with the current study. However, in some studies, an inverse relationship was expressed between them (37, 38), which is contrary to the present study and in some other studies no relationship was found between them (39, 40). In some studies on protein intake, a direct significant relationship is mentioned between protein intake and increased risk of BC (36, 40), which is in contrast to our findings and some other studies have found no relationship between protein intake and increased risk of BC (41). In our study, fish consumption was higher in healthy individuals than patients with cancer. Diet including chicken, fish and turkey is associated with a lower risk of breast cancer (30), which was consistent with our findings. Our findings indicated that patients with BC use more liquid and solid frying oils. The reports on this issue are contradictory. In some studies, there is a very close relationship between fat intake and increased risk of breast cancer (42, 43), which is consistent with our study. But in some studies, there were no relationship between them (38), which is contrary to our findings. The rate of cereal consumption was higher in healthy individuals than in patients with cancer. However, some studies have raised that whole-grain intake is associated with a lower risk of BC (30), which is contrary to our findings. Increased alcohol consumption increases BC (44). Alcohol consumption is one of the major risk factors for BC. Smoking increases the risk of breast cancer. Various studies conducted showed that the incidence of BC in smokers is 4.6 times higher and this rate is 3.2 times higher in women who are exposed to cigarette smoke for two hours a day for 25 years (14).

The published results from these studies have generally suggested that women who regularly consume alcohol may be at a slightly increased risk of the disease, but the findings reported for tobacco are inconsistent. Alcohol and tobacco consumption are known to be associated with another, and published results have not always allowed adequately for possible confounding between these exposures (9). There is potential for confounding between the possible effects of alcohol and of tobacco on BC, as drinking and smoking are closely associated, one with another (45-48). Given the high prevalence of breast cancer and its increasing trend, prevention and reduction of mortality due to breast cancer is very important. According to the results of this study, women with BC have more improper diet than healthy individuals; thus, diet is likely to be one of the important factors affecting BC and modifying diet can prevent BC or reduce its mortality. Therefore, emphasis on modified diet is recommended as a non-medical option for prevention of BC.

5.1. Strong Points

Considering high prevalence of BC and the direct relationship between nutritional factors and BC, modifying diet is recommended. Training and giving awareness is necessary for women and girls, especially about appropriate diet and unhealthy behavior.

5.2. Limitations

This study has been done on women referred to MRI center that – maybe - cannot represent all of the women and the results cannot be generalized to all the women of the child-bearing age and dietary assessment is mostly based on self-reports.

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Authors' Contributions

Maryam Atallahi participated in design and data collection, and writing the manuscript Zahra Masomi helped in design and writing the manuscript Sedigheh Sedighi helped in statistical analysis and writing the manuscript.

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