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Nutritional Factors Associated with Breast Cancer in Gaza Strip - Palestine: A Hospital Based Study

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To reveal the relationship between nutritional factors and dietary behavior and the occurrence of breast cancer in Gaza Strip.
Materials and Methods: A retrospective case-control study that consisted of 150 participants, conducted in Al-shifa hospital at Gaza Strip. A seven-day food frequency questionnaire, Anthropometric, Lipid profile (Cholesterol, HDL, LDL, and Triglyceride) and CBC tests were conducted for cases and controls. SPSS software was used to analyze obtained data.
Results: The study reveals that 72% of Breast cancer patients were >45 years old compared to 53.3% of controls with the same age. 20% of Breast cancer patients have family history compared to 3% of control group. The mean of menarche and marital age for breast cancer was higher in control. Fertility rates among cases were lower than in control. The mean of parity for breast cancer

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was 6.83 compare to 6.01 of control. Breastfeeding and duration among controls was significantly higher than breast cancer patients. Pills intake and injection hormones among breast cancer patients were significantly higher than in controls. There are significant differences in diet behavior among cases and control; 32.0% of case eat overcooked meat compare with 21.3% of controls; 69.3% of cases eat skinned chicken compare with 44.0% controls; 78.7% of breast cancer patients were eating whole fat dairy product compare to 45.3% of controls. 58.7% of breast cancer patients who have eaten vegetables and fruits daily compare to 88% of controls; about 56% of breast cancer drink less than one liter of water per day compare to 29.3% of controls.

Conclusion: The study concluded that breast cancer patients are less physically active, more obese, consume more oil and fat, eat more red meat, consume fruit and vegetable less frequently and are more exposed to stress.

Keywords: Breast cancer; nutritional factors; dietary behavior.

1. INTRODUCTION

Breast cancer was the first leading cause of death among Palestinian women in 2012 according to published agenda of the World Health Organization (WHO) [1]. Good nutrition and healthy lifestyle are important for the prevention of breast cancer. Bad dietary habits and unhealthy lifestyle have great impact on health, so nutritional assessment and follow-up are essential for reducing the risk of breast cancer. Unfortunately, nutritional assessment for risk factors of breast cancer are not adequately investigated in Palestine, therefore, this study could provide valid and credible information about the relationship between them.

Breast cancer is a cancer that starts in the cells of the breasts in women and men. Worldwide, in 2013 according to the World Health Organization International Agency for Research on Cancer (IARC). Breast cancer is the second most common type of cancer after lung cancer, 1.7 million women were diagnosed with breast cancer and there were 6.3 million women alive who have been diagnosed with breast cancer in the previous five years. Since 2008, it is estimated that breast cancer occurrence has increased by more than 20%, while mortality has increased by 14%. Breast cancer is also the most common cause of cancer death among women (522 000 deaths in 2012) and the most frequently diagnosed cancer among women in 140 of 184 countries worldwide. It now represents one in four of all cancers in women [2]. Latest estimations suggested that millions of new breast cancer cases occurred worldwide annually, with nearly 580,000 cases occurring in developed countries and the rest do in developing countries [2-3].

Nationally, according to the Palestinian Health Information Center (PHIC) and Ministry of Health (MOH) annual reports in 2005 in Palestine, breast cancer was the highest-leading cause of death among women in Palestine. In 2005 breast cancer causes 21.1% of all deaths from cancer which is the highest cancer-related mortality in Palestinian women, and 5.2 deaths per 100,000 women [4]. The breast cancer was the leading of cancers that affect the Palestinians and by up to 19% of all new cancer cases recorded in Palestine. The percentage of new cases recorded for breast cancer annually in Palestine is increasing from 11% in 2000 to 19% in 2010, concentrated occurrence of breast cancer in women in Palestine [5]. While the proportion is about 35.4% of new breast cancer cases recorded among females in Palestine [1].

Breast cancer is a type of cancer which originates from breast tissue, most commonly from the inner lining of milk ducts or the lobules that supply the ducts with milk. Cancers that originate from ducts are known as ductal carcinomas, while those originating from lobules are known as lobular carcinomas [6]. Breast cancer is a multi-factorial disease where genetic susceptibility, environment, nutrition and other lifestyle risk factors interact. Better identification of modifiable risk factors and risk reduction of breast cancer may help in implementing useful strategies for prevention [7].

Nutrition can play an important role in the prevention of breast cancer. Good nutrition may reduce the occurrence of breast cancer and the risk of breast cancer progression or recurrence, and also enhances overall quality of life [8]. Diets that are rich in plant-based foods such as fruits, vegetables, whole grains, legumes, nuts and seeds, choosing healthier fats, and eliminating alcohol from the diet can be important preventative steps to take. Ensuring that you have a healthy body weight and engage in regular physical activity also play an important

role. Also, nutrition is an important part of healing process. Maintaining optimal nutrition during breast cancer treatment can help prevent malnutrition, support immune function, rebuild body tissue, decrease your risk of infection and enhance overall well-being [9].

2. SUBJECTS AND METHODS

2.1 Study Design

A retrospective case control study was conducted at the oncology clinic to women with breast cancer at Al Shifa hospital in Gaza.

2.2 Study Setting and Population

The cases were interviewed at Al Shifa hospital in oncology clinic while the controls at orthopedic department. The target population was breast cancer patients attending Al Shifa hospital and the controls were without any suspicion of breast cancer at orthopedic department. They were recruited according to the inclusion criteria of the study after getting their consent.

2.3 Sampling, Sample Size and Timeframe

A Purposeful, non-random sample included 150 participants divided into two groups according to the eligibility criteria. Participants were allocated into: group A (n = 75) patients with newly diagnosed breast cancer; group B (n = 75) patients without any suspicion of breast cancer and used as a control. The study was started at the beginning of September, 2012 after seeking ethical approval. Data collection started on 2nd of February, 2013 and continued until July 25th, 2013.

2.4 Eligibility Criteria

2.4.1 Inclusion criteria

Cases were defined as women who were newly diagnosed with breast cancer and controls were defined as women who are free of breast cancer. Controls were cross-matched with age of cases (± 5 years).

2.4.2 Exclusion criteria

Patients with organ failure such as: kidney disease, hepatic disease, heart disease, and other cancers.

2.5 Data Collection

2.5.1 Interview and food frequency questionnaire

Semi-structured face-to-face interviews were conducted e.g., personal data such as gender, age, marital status, residency, education level etc.; family and present history of disease; dietary behavior and lifestyle. Food frequency questionnaire for 7 days was prepared (FFQ). The FFQ investigates patients' food intake and focuses on specific groups of foods and frequency of their consumption (the number of times per day the patient eats). The groups of food included meat, fish, eggs, dairy products, fruits & vegetables, grains, nuts & seeds, beverages, herbs, spices, oils and sweets.

2.5.2 Anthropometric measurements

Standard techniques were adopted for obtaining anthropometric measurements. Seca stadiometer was used to measure height. Weight was measured using Seca weighing scale and waist circumference (WC) was measured using tape measure. Weighing scale calibrated by constant weigh. Participants were weighed with essential clothing and without shoes. Body Mass Index (BMI) was calculated according to equation BMI= weight (kg)/height $(m)^2$.

2.5.3 Biochemical investigations

- The participants fasted for 12 hours before blood analysis.
- Five ml blood samples were obtained by venipuncture and divided into two tubes, one for lipid profile analysis and the other for complete blood count.
- For CBC analysis, blood was drawn in a tube with anticoagulant and analyzed using Cell-Dyn 1800 (made in Germany)
- For analysis Blood lipid profile included: total cholesterol, LDL-C, HDL-C, and TG. The serum was obtained by centrifugation (Centurion Scientific, C2 Series) at 3000 rpm (5 min.) and the serum was left at room temperature for 30 min. Lipid profile was determined using cholesterol Kit, HDL Kit, TG Kit and analyzed using Response 910 Diagnostic system (made in Germany).

2.6 Pilot Study and Ethical Consideration

A pilot study has been conducted before starting real data collection and all required approvals and consent forms of participants were filled.

2.7 Statistical Analysis

Statistical analysis was performed using SPSS program version 19.

2.8 Limitation of Study

This study has been conducted only in Al-Shifa hospital so, results can be generalized only on this sector. Also, shortage of local previous studies has prevented the researcher from discussing and comparing results with such studies.

3. RESULTS AND DISCUSSION

Descriptive analysis shows that the average age of cases (51.03±7.84) is older than controls (46.33±8.87) and this coincides with NZHTA report which states that breast cancer increases at the age of 50 then declines [1].

3.1 Distribution of Participants According to Their Breastfeeding Practice

The results show that breastfeeding among controls was significantly higher than cases. Similarly, exclusive breastfeeding among controls was higher than cases. However, the difference was statistically insignificant (Table 1).

The mean of duration of breast feeding for cases was significantly shorter (14.15 months than and control equals (17.25 month) (Table 2).

These findings agree with the results of Weir et al. [2] which show that breastfeeding is thought to reduce breast cancer risk and prolonged lactation has been demonstrated to have a protective effect by reducing the total number of ovulatory menstrual cycles and consequently cumulative ovarian hormone exposure, and during pregnancy increases prolactin which increases cell proliferation and decreases apoptosis in the breast. Other studies suggest that extended period of breastfeeding during women's life time can reduce breast cancer. Although breastfeeding may be one factor that reduces woman's risk of breast cancer, it is certainly not the only factor determining its risk [3]. Among BRCA1 mutation carriers, breastfeeding for at least one year was associated with a 32% reduction in risk (OR = 0.68; 95% CI 0.52 to 0.91; P = 0.008); breastfeeding for two or more years conferred a greater reduction in risk (OR = 0.51; 95% CI 0.35 to 0.74) [4].

3.2 Distribution of Participants by Anthropometric Measurements

The controls were statistically lighter than the cases. This agrees with previous studies that have found a positive association between weight gain and increase of breast cancer risk. Weight gain throughout adult life was associated with a relative risk ranging from 0.5 to 1.2 in premenopausal women and 1.4 to 2.5 in postmenopausal women and this is due to the fact that weight gain reflects mainly an increase in body fat. The mean of BMI for cases was greater than the control. The mean of waist circumference for cases was significantly greater than control.

Table 1. Relationship between cases and controls regarding breastfeeding

Variable	Cases positive BC	Controls negative BC	Total	*P value*
Breastfeeding	**No (%)**	**No (%)**	**No (%)**	<0.001*
Yes	60 (80.0)	73 (97.3)	133 (88.7)	
No	15 (20.0)	2 (2.7)	17 (11.3)	
Total	75 (100.0)	75 (100.0)	150 (100.0)	
Breastfeeding (if yes)	**No (%)**	**No (%)**	**No (%)**	0.431
Exclusive	41 (68.3)	52 (71.2)	93 (69.9)	
Not exclusive	19 (31.7)	21 (28.8)	40 (30.1)	
Total	60 (100.0)	73 (100.0)	133 (100.0)	

**Statistically Significant (Significant correlation at 0.05 level)*

Table 2. Two independent t test between study participants and breastfeeding

Variable	Subject	Number	Mean	SD	T- test	*P value*
Duration of breastfeeding (month)	Positive BC	60	14.15	4.210	-3.754	<0.001*
	Negative BC	73	17.25	5.123		

**Statistically Significant (Significant correlation at 0.05 level)*

Table 3. Independent t test of anthropometric measurements

Variable	Subject	Number	Mean	SD	t-test	*P value*
Weight	Positive BC	75	85.933	14.00	3.962	< 0.001*
	Negative BC	75	76.56	14.03		
Height	Positive BC	75	158.613	6.35	-0.374	0.709
	Negative BC	75	158.96	4.90		
BMI	Positive BC	75	34.017	5.24	3.832	< 0.001*
	Negative BC	75	30.411	6.23		
Waist Circumference	Positive BC	75	112.320	13.41	7.364	< 0.001*
	Negative BC	75	96.45	12.96		

**Statistically Significant (Significant correlation at 0.05 level)*

This agrees by Haakinson et al. [5] study which found obese patients were more likely to present with disease detected by imaging when compared to non-obese. Obese patients had large tumors and higher rate of lymph node metastasis.

3.3 Distribution of Participants by Blood Lipid Profile

Table 4 shows significant high average of blood lipid profile (triglyceride, cholesterol, HDL-c, LDL-c) of cases compared with the control. Plasma lipids level reflects dietary lipid intake in individuals. There are several reports of elevated plasma lipid level such as total lipids, triglycerides (TG), total-cholesterol (T-CHO), low density lipoprotein-cholesterol (LDL-C) and free fatty acids in pre and post-menopausal breast cancer patients. It has been postulated that changes in the concentration of serum lipids in the breast cancer patients could result in an increase in production of tumor necrosis factor and inhibit adipose lipoprotein lipase activity by the action of insulin. These changes impair the catabolism of very low density lipoprotein (VLDL), leading to an increase in high density lipoprotein-cholesterol (HDL-C) [6,7].

3.4 Relationship between Cases and Controls, and Iron and Folic Acid Supplement

The current study reveals that controls had taken iron and folic acid in significant higher percentage than cases (Table 5).

Table 4. Independent t test comparing the means of blood lipid profile

Blood lipid profile	Subject	Number	Mean	SD	t-test	*P value*
Triglyceride	Positive BC	75	166.80	72.46	2.320	0.02*
	Negative BC	75	145.933	28.61		
Total cholesterol	Positive BC	75	211.027	39.31	3.360	< 0.001*
	Negative BC	75	188.920	41.23		
HDL-c	Positive BC	75	50.11	11.23	1.680	0.04*
	Negative BC	75	47.39	8.43		
LDL-c	Positive BC	75	127.837	39.02	2.345	0.02*
	Negative BC	75	122.739	39.82		

**Statistically Significant* (*Significant correlation at 0.05 level)*

Table 5. Relationship between cases and controls and nutrient supplementation

Variable	Cases positive BC	Controls negative BC	Total	*P value*
Iron & folic acid intake	**No (%)**	**No (%)**	**No (%)**	0.004*
Yes	27 (36.0)	44 (58.7)	71 (47.3)	
No	48 (64.0)	31 (41.3)	79 (52.7)	
Total	75 (100.0)	75 (100.0)	150 (100.0)	

**Statistically Significant (Significant correlation at 0.05 level)*

Results of the current study agree with a large prospective study of 24,500 postmenopausal women which show a 19% higher risk of breast cancer in women who were reported taking supplementary folic acid (400 µg/d) and a 32% increase in risk in women in the highest quintile of total folate intake (853 µg/d). It is noteworthy that no association was found in the latter study between breast cancer and folate derived solely from food [8,9].

3.5 Dietary Behavior

3.5.1 Use of pressure cookers (Overcooking meat)

The use of pressure cookers for meat cooking was significantly higher among cases than controls (Table 6) which coincides with Wei Zheng [10] study results on the associations between intake of high temperature cooked meat and breast cancer risk. Also, this finding agrees with the results obtained by Hanf & Gonder, and Steck et al. [11,12] in Finland which revealed a positive association between overcooking meat and breast cancer.

3.5.2 Cooking chicken

The study clarified that more than two thirds of cases cook chicken with skin compare with less than half of the controls (Table 6). And therefore, cooking chicken with skin has a positive association with increase of breast cancer risk. A reasonable explanation for such association could be that chicken skin typically contains high amounts of fat; and therefore causes weight gain leading to increase in levels of endogenous estrogen and may increase the concentration of several circulating cytokines, which stimulate the the enzymes involved in the synthesis of estrogen. Boyd et al. [13] study found 13% increase in breast cancer risk among women with the highest level of fat intake compared with those with the lowest level.

3.5.3 Type of fish intake

Among cases, eating Sardine was (91.2%) lower than controls (96.9%). There was statistically non-significant difference between the cases and controls regarding the type of fish intake as shown in (Table 6). This finding of lack of association, between type of fish and breast cancer, disagrees with Zheng et al. [14] study which found that oily fish such as sardines, salmon, tuna are rich with marine n-3 PUFA (polyunsaturated fatty acid) which reduce breast cancer risk by enhancing the metabolism of estradiol to inactive catechol estrogens. While another study by Terry et al. [15] found that high consumption of fish was weakly associated with reduced breast cancer risk, and the association was not statistically significant.

3.5.4 Type of dairy product

The results of the current study show that dairy products with whole fat are positively associated with increase of breast cancer risk in comparison to skimmed fat dairy products. The current study agrees with the results of Missmer et al. [16] study which show that dairy products, such as whole milk and many types of cheese rich in fat, may increase breast cancer risk and this could be due to milk products content of contaminants such as pesticides, which have carcinogenic potential, and growth factors such as insulin-growth Factor-I, which have been shown to promote breast cancer cell growth.

3.6 Frequency of Dietary Intake

3.6.1 Dairy product intake

The current results reveal that cases consume less dairy products than controls and this disparity was statistically significant. This finding indicates a negative association between dairy products intake and breast cancer risk (Table 7). The protective effect of dairy products against breast cancer risk could be related to the anti-carcinogenic properties of vitamin D which disrupts breast cancer cell growth by apoptosis and this agrees with result of Moorman & Terry (2004) study which showed that dairy products may protect against breast cancer [17].

3.6.2 Vegetable and fruit intake

A significant protective effect of vegetable and fruit intake against breast cancer was noticed in the current study. The results show that the percentage of cases who have daily intake of vegetables and fruits was lower than controls (Table 7). These findings concur with the results obtained in a previous study conducted to evaluate the relationship between fruit and vegetables consumption, and breast cancer [18]. The study shows that fruit and vegetables consumption has a protective effect and decreases breast cancer occurrence through their antioxidants, fiber and other nutrients.

Table 6. Distribution of the study sample according to dietary behavior

Variable	Cases positive BC	Controls negative BC	Total	*P value*
Pressurized utensils use	**No (%)**	**No (%)**	**No (%)**	0.04*
Yes	24 (32.0)	16 (21.3)	40 (26.7)	
No	51 (68.0)	59 (78.7)	110 (73.3)	
Total	75 (100.0)	75 (100.0)	150 (100)	
Cooking chicken	**No (%)**	**No (%)**	**No (%)**	< 0.001*
Skinned	52 (69.3)	33 (44.0)	85 (56.7)	
Un-skinned	23 (30.7)	42 (56.0)	65 (43.3)	
Total	75 (100.0)	75 (100.0)	150 (100)	
Type of fish intake	**No (%)**	**No (%)**	**No (%)**	0.152
Tuna	6 (8.8)	2 (3.1)	8 (6.0)	
Sardine	62 (91.2)	63 (96.9)	125 (94.0)	
Total	68 (100.0)	65 (100.0)	133 (100)	
Type diary product	**No (%)**	**No (%)**	**No (%)**	< 0.001*
Whole fat	59 (78.7)	34 (45.3)	93 (62.0)	
Skimmed fat	16 (21.3)	41 (54.7)	57 (38.0)	
Total	75 (100.0)	75 (100.0)	150 (100)	

**Statistically Significant (Significant correlation at 0.05 level)*

3.6.3 Canned food intake

The results presented in Table 7 show that more than half of cases eat canned food once a week or less. On the other hand, less than half of controls did not eat canned food. A statistical significant difference was found between cases and controls regarding canned food intake. The results of the current study show that canned food intake associated with increase of breast cancer risk. This could be attributed to that bisphenol A (BPA) leaches from containers and can linings, enters food and beverages, and ultimately, gets inside human body. BPA is a synthetic estrogen that can disrupt the hormone system, particularly when exposures occur during gestation or in early life. Miniscule exposures have been associated with a wide range of adverse health effects, including increase of breast cancer risk, early puberty in girls, weak immune system and obesity. Furthermore, higher levels of BPA were associated with markers of oxidative stress and inflammation [19].

3.6.4 Drinking water

Regarding water drinking habits, more than half of cases drink less than one liter of water daily compared to less than one third of control (Table 7). Water acts as detoxification agent which removes toxins from body and many research suggest that drinking enough water every day, could reduce risk of developing breast cancer. Woolcott et al. [20], study found that good hydration can reduce the risk of breast cancer by 33% for premenopausal women and 79% for postmenopausal women and this agrees with the results obtained in the present study which shows a significant protective effect for drinking water against breast cancer. Cases who drink less than one liter of water per day were (56%) compare with (29.3%) of the controls.

3.7 Servings of Dietary Intake

3.7.1 Dairy products intake

Table 8 shows that the means of daily yogurt intake by cases were lower than the controls and the difference was statistically significant; the cheese intake per day by case was lower than the control and the difference was statistically significant. The results of the present study show that daily yogurt intake could have a protective effect against breast cancer where it found that yogurt intake per day among cases was significantly lower than controls. This finding concurs with several previous studies conducted in France and Uruguay which have found that yogurt consumption is associated with reduction of breast cancer risk through their probiotics content which can help maintain the balance of bacteria necessary for boosting the immune system and stimulating infection-fighting white cells in the bloodstream or due to a factor that has anti-tumor effects. It has been suggested that the protective effect of yogurt intake could be related to the yogurt-rich content of conjugated linoleic acid (CLA). There are several

postulated mechanisms of CLA role in cancer which include: effects on oxidative behavior in cancer cells, effects on the metabolism of linoleic acid and induction of apoptosis [21,22].

3.7.2 Protein intake

Table 9 shows that high red meat intake is associated with increase of breast cancer risk as it was found that cases were consuming more serving size per day of red meat than controls and this was statistically significant. These findings agree with results obtained in previous studies conducted to evaluate the association between red meat intake and risk of breast cancer. It was observed that 12% increase in breast cancer risk was noticed per 50-gram increment of meat intake each day. Red meat is rich in bioavailable iron and free iron is associated with oxidative DNA damage and lipid peroxidation which may increase the risk of breast carcinogenesis [23].

Regarding fish intake, the present study shows that fish intake has a significant protective effect against breast cancer risk. Table 9 shows that fish intake among controls was significantly higher than cases and this agrees with the result of Terry et al. [24] which found the consumption of fish and marine fatty acids lowers the risk of breast cancer by enhancing the metabolism of estradiol to inactive catechol estrogens. In another study, it was found that for every 0.1 g per day increase in the consumption of n-3 polyunsaturated fatty acid (n-3 PUFA) from fish, the risk of breast cancer decreased by 5% [25]. Furthermore, our study also shows that chicken intake among controls was higher than cases and this difference was found to be statistically significant. The decrease in BC risk with chicken intake could be attributed to that: chicken meat contains lower amounts of saturated fats, iron and cholesterol in comparison with red meat. Finally, the results of the current study show that there is no significant association between eggs intake and the increase in breast cancer risk; however, eggs intake per day among cases was higher than controls. Egg yolks are a significant source of choline, consumption of which has been found to be associated with lower risk of breast cancer in some studies such as North American and European studies by Pala et al. [26]. The study finds that breast cancer risk slightly decreases among women who consume fewer than two eggs per week but slightly increases among women who consume one or more eggs per day compared to women who do not eat eggs.

Table 7. Distribution of the participants according to their dietary intake

Variable	Cases positive BC	Controls negative BC	Total	*P value*
Diary product intake	**No (%)**	**No (%)**	**No (%)**	0.026*
Daily	31 (41.3)	45 (60.0)	76 (50.7)	
Twice a week	30 (40.0)	25 (33.3)	55 (36.7)	
Once a week or less	14 (18.7)	5 (6.7)	19 (12.7)	
Total	75 (100.0)	75 (100.0)	150 (100)	
Vegetables fruits intake	**No (%)**	**No (%)**	**No (%)**	<0.001*
Daily	44 (58.7)	66 (88.0)	110 (73.3)	
Twice a week	24 (32.0)	9 (12.0)	33 (22.0)	
Once a week or less	7 (9.3)	0 (0.0)	7 (4.7)	
Total	75 (100.0)	75 (100.0)	150 (100)	
Canned food intake	**No (%)**	**No (%)**	**No (%)**	0.030*
Daily	0 (0.0)	2 (2.7)	2 (1.3)	
Twice a week	6 (8.0)	13 (17.3)	19 (12.7)	
Once a week or less	40 (53.3)	27 (36.0)	67 (44.7)	
Do not eat canned food	29 (38.7)	33 (44.0)	62 (41.3)	
Total	75 (100.0)	75 (100.0)	150 (100)	
Drinking water/day	**No (%)**	**No (%)**	**No (%)**	0.002*
Less than 1L	42 (56.0)	22 (29.3)	64 (42.7)	
1L-2L	26 (34.7)	47 (62.7)	73 (48.7)	
More than 2L	7 (9.3)	6 (8.0)	13 (8.7)	
Total	75 (100.0)	75 (100.0)	150 (100)	

**Statistically Significant (Significant correlation at 0.05 level)*

Table 8. Independent t test comparing the means of daily number of dairy products servings among study participants

Variable	Subject	Number	Mean	SD	t -test	*P value*
Yogurt	Positive BC	34	0.268	0.181	-2.535	< 0.001*
	Negative BC	53	0.409	0.291		
Cheese	Positive BC	68	0.353	0.275	-1.965	0.02*
	Negative BC	72	0.444	0.273		

**Statistically Significant (Significant correlation at 0.05 level)*

Table 9. Independent t test comparing the means of daily number of meat, fishes, eggs serving among participants

Variable	Subject	Number	Mean	SD	t- test	*P value*
Red meat	Positive BC	75	0.264	0.288	2.175	0.031*
	Negative BC	72	0.184	0.126		
Turkey	Positive BC	75	0.190	0.111	-3.015	0.003*
	Negative BC	75	0.257	0.157		
Fish	Positive BC	75	0.220	0.154	-2.142	0.034*
	Negative BC	75	0.281	0.193		
Eggs	Positive BC	65	0.576	0.506	1.632	0.105
	Negative BC	72	0.445	0.435		

**Statistically Significant (Significant correlation at 0.05 level)*

3.7.3 Vegetable intake

Table 10 shows no statistically significant association was found between spinach intake and breast cancer risk. However, the results show that spinach intake among breast cancer patients was lower than controls and this difference, even insignificant, agrees with the results obtained by Boggs et al. [27] who found inverse association between breast cancer risk and increasing consumption of spinach. It is well known that spinach is a wonderful green-leafy vegetable often recognized as one of the functional foods for its nutritional, antioxidants, anti-cancer constituents and is considered a very good source of dietary fibers, vitamins (A, C, E, K, Thiamin, Riboflavin, Vitamin B6, Folate).

High Potatoes intake was associated with increase of breast cancer risk in the current study where it was found that Potatoes intake by cases is higher than control and this difference was found to be statistically significant and this may be related to potatoes rich with carbohydrate which have indirect relationship with increase of breast cancer risk by affecting insulin resistance and weight again and this agrees with several studies conducted by Burley et al. [28] and Stadler et al. [29] who have found an positive association between breast cancer risk and increasing consumption of potatoes and other carbohydrate such as chips, and some bread, this could be attributed to acrylamide is formed principally by the maillard reaction between the amino acid asparagine and reducing sugars such as glucose.

Onion and Scallion were found to have a significant protective effect against breast cancer risk as their intake by cases was smaller than controls. Raw onions and scallion contain beneficial sulphur-containing compounds (e.g diallyl sulfide, diallyl disulfide and diallyl trisulfide) that inhibit carcinogen activation through modulation of cytochrome P450-dependent monooxygenases and/or acceleration of carcinogen detoxification via induction of phase II enzymes (glutathione transferees, quinone reductase, etc.) are believed to be responsible for protective effects of organosulfur compounds (OSC) against chemically induced cancers. More recent studies have indicated that some naturally occurring OSC analogues can suppress proliferation of cancer cells in culture and inhibit growth of transplanted tumor in vivo by inducing apoptosis and/or by perturbing cell cycle progression [30]. Furthermore, onions contain high concentrations of flavonoids which have antioxidant and anti- inflammatory effects which may contribute to its cancer preventive activity. These findings agree with results obtained in previous studies conducted to evaluate the association between raw onions and risk of breast cancer development [31,32].

Table 10. Independent t test comparing the means of daily number of different types of vegetable serving among participants

Variable	Subject	Number	Mean	SD	t- test	*P value*
Spinach	Positive BC	52	0.158	0.139	-1.876	0.06
	Negative BC	67	0.199	0.088		
Potatoes	Positive BC	65	0.849	0.706	4.408	< 0.00*
	Negative BC	70	0.431	0.302		
Onion	Positive BC	59	0.393	0.353	-4.352	< 0.00*
	Negative BC	71	0.642	0.297		
Garlic	Positive BC	21	0.456	0.350	0.064	0.95
	Negative BC	34	0.447	0.602		
Scallion	Positive BC	31	0.210	0.142	-3.523	< 0.00*
	Negative BC	41	0.411	0.326		
Tomato	Positive BC	68	0.815	0.579	-3.173	< 0.00*
	Negative BC	75	1.145	0.657		
Cabbage	Positive BC	58	0.184	0.134	-1.604	0.11
	Negative BC	74	0.227	0.167		
Green Peppers	Positive BC	38	0.190	0.139	-2.754	< 0.001*
	Negative BC	56	0.312	0.285		
Red Peppers	Positive BC	33	0.234	0.363	-1.118	0.267
	Negative BC	56	0.312	0.285		
Carrots	Positive BC	56	0.606	0.610	0.909	0.36
	Negative BC	63	0.516	0.469		

**Statistically Significant (Significant correlation at 0.05 level)*

Regarding garlic intake, the collected data show that garlic intake among cases was higher than controls and this difference was not statistically significant. This finding disagrees with the results obtained in Link LB & Potter [33] study which showed that the greater the consumption of raw garlic, the lower the risk of developing breast cancer. This inconsistency could be attributed to the participant's behavior in garlic intake. Eating cooked garlic leads to lose active substances (Sulforaphane) during crushing or cooking and thus losing anticancer properties. Finally, although carrots intake by cases was higher than controls, no statistically significant relationship was found between carrots intake and breast cancer in our study. This could be explained by that breast cancer women were eating carrot after disease or eating carrot without fat medium that cause less vitamin A absorption and therefore less effective in protecting against breast cancer.

Moreover, the obtained results show that tomato has a significant protective effect against breast cancer risk and this agree with several studies conducted by Masala et al. [34] which found an inverse association between breast cancer risk and increasing consumption of tomatoes. Tomatoes are a rich source of important phytochemicals such as: carotenoids; lycopene; melatonin; flavonoids (e.g., quercetin) all of which have been found to have anti-cancer activities in addition to their anti-oxidant and anti-inflammatory effects [35,36]

The current study reveals an association between the consumption of green peppers, red peppers and lowering breast cancer risk. It was found that pepper intake among cases was significantly less than controls. This decrease in breast cancer risk is due to that green and red peppers are a good source of vitamin C and other valuable phytochemicals which act as antioxidants that could inhibit the harmful oxidation process within cells and thus have protective agents against the damaging effects of free radicals which attack healthy cells and changes their DNA, allowing tumors to grow [37]. There have been many studies showing that the nutrients found in bell peppers possess strong anti-cancer activity, particularly in prostate, breast, and lung cancer. On the other hand, the results of the current study show that cabbage intake among cases was lower than controls; however, this difference was not statistically significant. Cabbage contains sulforaphane which has antibacterial and anticancer properties and a potent inducer of protective enzymes that provide defense against cancer-causing chemicals. A study conducted by Lee et al. [38] has found an inverse association between breast cancer risk and increasing consumption of Cabbage.

3.7.4 Fruits intake

Table 11 shows the means of different types of Fruits servings among participants. Guava, Citrus, Strawberries, and Grapes intake by cases was lesser than control and this difference was found to be statistically significant. Apple and banana intake by cases have insignificantly higher than control. The current results show that cases were consuming more (serving size per day) of apple and banana than controls. Our finding disagrees with Hai Liu et al. [39] and Reagan-Shaw et al. [40] who have found that apple have protective effect against breast cancer. Apple exhibit strong antioxidant and antiproliferative activities and that the major part of total antioxidant activity is from the combination of phytochemicals including phenolics and flavonoids, are suggested to be the bioactive compounds contributing to the health benefits of apples, Moreover, study conducted on Guangdong and China by Zhang et al. [41] who have found that banana is inversely and significantly related with breast cancer risk and this inconsistency could be attributed to breast cancer is a multi-factorial disease where genetic susceptibility, environment, nutrition and other lifestyle risk factors interact.

The current study reveals that Guava, Strawberries, Grapes and Citrus were found to have a protective effect against breast cancer where guava, citrus, strawberries, grapes intake by cases was less than controls and this difference was statistically significant.

3.7.5 Grains, nuts and seeds intake

Table 12 show the mean of carbohydrate daily intake of different types of grains daily among participants. Cases consuming more serving size per day of bread, pasta, rice, Cuscus, and biscuits which was statistically significant. Meanwhile, crackers, pizza, and pancakes intake by cases have not significant higher mean than control.

Bread, Pasta, Rice, Cuscus, and Biscuits intake were found to be positively associated with increase of breast cancer risk in the current study. The collected data reveal that the consumption (serving size per day) of bread pasta, rice, cuscus and biscuits by cases was significantly higher than controls. These grains contain high amount of carbohydrate, it may influence breast cancer risk by affecting insulin resistance and triggers insulin release also it may cause obesity which increases breast cancer risk and this agrees with study conducted on Italian women by Augustin et al. [42] which have found a higher risk of breast cancer among those consuming high levels of grain such as bread, pasta and rice. Moreover, biscuits contain high amount of carbohydrate along with using unhealthy fat (trance and saturated fatty acid) during preparation. Also the current study shows that cases consuming more serving size per day of Crackers, Pizza, and Pancakes in comparison to controls; however, the difference was not statistically significant. Such types of food are rich in carbohydrate and unhealthy fat. Table 13 shows means of Nuts & Seeds serving among participants. Almonds intake by cases was higher than control and this difference was found to be statistically significant. Walnuts, Pistachios, and Cashew intake by cases have insignificantly higher than control. Pumpkin seed intake by cases lower than control.

In the current study, breast cancer patients were consuming significantly more serving size per day of almonds in comparison to controls. No significant difference was found between cases and controls regarding walnuts, cashew and pistachios intake, although cases were consuming more serving size per day of walnuts and pistachios in comparison to controls. Eating raw nuts rather roasted and salted nuts could be beneficial. Roasted could destroy some of the nutritional value of these seeds and the oils added for roasting are often not healthy fats. Furthermore, the results show that pumpkin seeds intake among cases was lower than controls; however, the difference was not statistically significant. Pumpkin seeds are important for immune system as they contain a lot of antioxidants (carotenoids), omega-3 fatty acids. Similar results were found by Saha et al. [43] who found that eating pumpkin seeds lowers the risk of breast cancer by 23% in postmenopausal women.

3.7.6 Beverages and herbs intake

Table 14 shows the means of different beverages among participants. Drinking soft drinks, juice and fresh juice by cases have significant higher than control. The coffee intake by cases is lower than control.

Table 11. Independent t test comparing the means of daily number of different types of fruits serving

Variable	Subject	Number	Mean	SD	t- test	*P value*
Apple	Positive BC	66	0.718	0.583	1.022	0.30
	Negative BC	70	0.620	0.531		
Guava	Positive BC	68	0.207	0.179	-5.470	< 0.001*
	Negative BC	69	0.562	0.509		
Citrus	Positive BC	63	0.192	0.157	-7.800	< 0.001*
	Negative BC	73	0.785	0.628		
Banana	Positive BC	61	0.454	0.499	0.906	0.36
	Negative BC	67	0.384	0.377		
Strawberries	Positive BC	28	0.066	0.094	-5.372	< 0.001*
	Negative BC	48	0.252	0.205		
Grapes	Positive BC	69	0.219	0.189	-4.116	< 0.001*
	Negative BC	71	0.427	0.380		

**Statistically Significant (Significant correlation at 0.05 level)*

Table 12. Independent t test comparing the means of grains serving

Variable	Subject	Number	Mean	SD	t- test	*P value*
Bread	Positive BC	75	1.920	0.273	4.375	< 0.001*
	Negative BC	75	1.628	0.508		
Crackers	Positive BC	32	0.421	0.503	0.263	0.79
	Negative BC	26	0.389	0.386		
Pasta	Positive BC	50	0.153	0.126	3.363	< 0.001*
	Negative BC	42	0.087	0.054		
Pizza	Positive BC	40	0.107	0.105	0.741	0.46
	Negative BC	35	0.092	0.066		
Rice	Positive BC	64	0.576	0.486	4.469	< 0.001*
	Negative BC	70	0.295	0.138		
Cuscus	Positive BC	44	0.082	0.049	2.659	0.01*
	Negative BC	20	0.055	0.033		
Biscuits	Positive BC	41	0.827	0.695	4.211	< 0.001*
	Negative BC	53	0.347	0.251		
Pancakes	Positive BC	45	0.135	0.142	0.443	0.65
	Negative BC	25	0.121	0.097		

**Statistically Significant (Significant correlation at 0.05 level)*

Table 13. Independent t test comparing the means of nuts & seeds serving

Variable	Subject	Number	Mean	SD	t -test	*P value*
Walnuts	Positive BC	27	0.166	0.209	0.293	0.771
	Negative BC	33	0.153	0.125		
Pumpkin Seed	Positive BC	27	0.180	0.237	-0.374	0.710
	Negative BC	18	0.210	0.305		
Almonds	Positive BC	6	0.276	0.228	2.316	0.034*
	Negative BC	6	0.060	0.000		
Cashew	Positive BC	24	0.181	0.223	1.147	0.261
	Negative BC	42	0.125	0.101		
Pistachios	Positive BC	31	0.181	0.203	1.194	0.237
	Negative BC	38	0.134	0.115		

**Statistically Significant (Significant correlation at 0.05 level)*

Drinking of soft drinks, juice by cases was significantly higher than controls and therefore are positively associated with the increase of breast cancer risk in the current study and this agrees with study by Malik et al. [44] which found that consumption of sugar-sweetened beverages, particularly carbonated soft drinks, association with increase of breast cancer risk. This association could be due to the fact that these drinks are key contributors to the epidemic

of overweight and obesity, by virtue of these beverages' high added sugar content, low satiety, and incomplete compensation for total energy. The results of the current study show that coffee intake was lower among cases than controls; however, this difference was not statistically significant. These obtained results agree with results obtain by Fagherazzi et al. [45] study conducted to evaluate the relationship between coffee or caffeine intake and breast cancer risk. This lack of association could be due to the small sample of participants but another study by Yu et al. [46] found that coffee drinking was inversely associated with breast cancer risk. Table 15 shows means of different herbs intake among participants. Chamomile and rosemary intake by cases was higher than control and this difference was found to be statistically significant. Licorice, and ginger intake by cases was smaller than control and this difference was found to be statistically significant. Black tea intake by cases was higher than control. Green tea and thyme intake by cases was lower than control.

In the current study, a positive association between chamomile and rosemary consumption and the increase of the occurrence of breast cancer was found. Chamomile and rosemary intake by cases was significantly higher than controls. This could be attributed to that chamomile and rosemary intake among BC patients was during treatment. On the contrary, the results of the current study show that licorice has a significant protective effect against breast cancer and this could be due to the estrogenic properties of glabridin and isoflavan in licorice root and this agrees with the results of Tamir et al. [47] study which found that isoflavans and Glabridin and their derivatives have estrogen-like activities which exhibited varying degrees of estrogen receptor agonist in different tests and demonstrated growth-inhibitory actions on breast cancer cells. Similarly, it was found that ginger has a significant protective effect against breast cancer due to phenolic ingredients, such as gingerols and 6-shogaols, as anticancer and this agrees with Elkady et al. [48] study which found that ginger suppressed the proliferation and colony formation in breast cancer cell lines and the ginger may be a promising candidate for the treatment of breast carcinomas.

Table 14. Independent t test comparing the means of different beverages

Variable	Subject	Number	Mean	SD	t- test	*P value*
Soft drinks	Positive BC	47	0.607	0.669	1.870	0.03*
	Negative BC	59	0.402	0.386		
Coffee	Positive BC	36	0.602	0.475	-1.485	0.14
	Negative BC	50	0.758	0.487		
Juice	Positive BC	21	0.578	0.509	2.784	0.01*
	Negative BC	19	0.249	0.173		
Fresh juice	Positive BC	51	0.469	0.404	1.953	0.02*
	Negative BC	32	0.325	0.265		

**Statistically Significant (Significant correlation at 0.05 level)*

Table 15. Independent t test comparing the means of different herbs intake

Variable	Subject	Number	Mean	SD	t- test	*P value*
Black tea	Positive BC	62	1.560	0.661	0.954	0.34
	Negative BC	61	1.452	0.591		
Green tea	Positive BC	1	1.000	-	-0.481	0.63
	Negative BC	13	1.373	0.748		
Licorice	Positive BC	8	0.195	0.126	-18.02	< 0.001*
	Negative BC	6	1.000	0.000		
Chamomile	Positive BC	18	0.573	0.491	3.814	< 0.001*
	Negative BC	11	0.131	0.027		
Ginger	Positive BC	4	0.142	0.000	-5.423	< 0.001*
	Negative BC	18	0.658	0.404		
Rosemary	Positive BC	66	1.550	0.636	1.779	0.03*
	Negative BC	64	1.355	0.612		
Thyme	Positive BC	68	0.381	0.214	-0.965	0.33
	Negative BC	69	2.378	17.057		

**Statistically Significant (Significant correlation at 0.05 level)*

Regarding green vs. black tea intake, the collected data reveal that black tea intake by cases was higher than controls while green tea intake by cases was lower than controls and this difference were found to be statistically not significant. Similar findings were found by Sun et al. [49] which noticed that black tea intake was not related to the decrease of risk of breast cancer and 22% reduction of the risk of breast cancer for highest intake versus non/lowest intake of green tea and this could be attributed to that tea composition varies with the processing method of tea. The amounts of catechins which have antiproliferative effects on tumour cells in green tea are up to 10 times more than in black tea, possibly accounting for the lack of risk reduction associated with black tea drinking.

3.7.7 Spices intake

Table 16 shows means of different spices among participants. Basil, cloves and turmeric intake by cases was lower than control and this difference was found to be statistically significant. Cinnamon intake by cases was lower than control.

The results of this study reveal a direct and inverse relationship between basil and breast cancer risk as it was found that basil intake among cases was significantly lower than controls. This protective action could be attributed to Basil's antioxidant, antimutagenic and antitumorigenic properties likely arise from a variety of components including linalool, 1, 8-cineole, estragole, and eugenol and this agrees with Kaefer and Milner [50] study which found an association between Basil and the reduction in breast cancer. Similarly, cloves were found to have a significant protective effect against breast cancer. Cloves intake by cases was smaller than controls. Clove contains several important phytochemicals including: tannins; terpenoids; eugenol; acetyleugenol which have a detoxification effect in the human body. To the best of our knowledge, no studies have been conducted on humans to date to evaluate use of cloves in cancer prevention, a few studies conducted on mice suggest its effectiveness, especially in modifying cellular detoxification processes [50].

Moreover, the results of this study show a direct relationship between Curcumin intake and the decrease in breast cancer risk where curcumin intake by cases was smaller than control and this difference was found to be statistically significant. Curcumin (diferuloylmethane) is a polyphenol derived from the *Curcuma longa* plant, commonly known as turmeric. More recently curcumin has been found to possess anti-cancer activities via its effect on a variety of biological pathways involved in mutagenesis, oncogene expression, cell cycle regulation, apoptosis, immunomodulatory, tumorigenesis and metastasis. In addition, curcumin affects a variety of growth factor receptors and cell adhesion molecules involved in tumor growth and our result of study agree with Wilken et al. [51] and Bar-Sela et al. [52] who found curcumin as a chemopreventive and therapeutic agent. Finally, the collected data show that Cinnamon intake among cases was lower than control and this difference was found to be statistically insignificant. Cinnamon extracts contain several active components such as essential oils (cinnamic aldehyde and cinnamyl aldehyde) where these components have various biological functions including antioxidant, antimicrobial, anti-inflammation and antitumor activity and this agree with Madkor et al. [53] study which suggested that the extracts of cinnamon plant have antiangiogenic protective activities in the prevention of breast cancer.

3.7.8 Oils and sweets intake

Table 17 shows means of servings of different oils among participants. Corn oil, Sunflower oil, and Butter intake by cases was higher than control and this difference was found to be statistically significant. Olive oil intake by cases was higher than control. The study results show direct relationship between corn oil and sunflower oil intake and increase of breast cancer and this agrees with the results found in a study conducted by Maillard et al. [54]. The study finds out that lower dietary omega-6/omega-3 ratios in oil vegetable are associated with reduced risk of breast cancer. Corn oil and Sunflower oil contain high amount of omega-6 and therefore would tend to increase the omega-6/omega-3 ratio and increase occurrence of breast cancer.

Similarly, butter intake was found to have a positive association with increase of breast cancer risk (butter intake by cases was significantly higher than controls). Similar results were found by Jordan et al. [55] who noticed that diet characterized by a low P/S ratio (polyunsaturated/saturated) seems to be more important for the development of breast cancer than total fat intake such as butter which is rich

in saturated fat. Also another study, conducted to evaluate the relationship between butter and the occurrence of breast cancer by Trichopoulou et al. [56], found that butter appears to be associated with an elevated risk for breast cancer. Finally, there was no statistically significant associations between olive oil intake and breast cancer risk in our study where olive oil intake among cases was higher than controls. Results found by Alegre et al. [57] who noticed that olive oil have demonstrated that it may influence crucial transcription factors and reduce breast tumor aggressiveness. And another study by Hassan et al. [58] who found that Olive oil induces apoptosis via activation of the p53 pathway in some cancer cells due to phenolic compounds like oleuropein whereas oleuropein has anti-cancer activity. This inconsistency could be attributed to that olive oil intake among BC patients took place during treatment. Table 18 shows means of servings of different sweets among participants. Chocolate intake by cases was higher than that by control and this difference was found to be statistically significant. Honey, jam and Kunafeh intake by cases was higher than that by control and this difference was found to be statistically insignificant.

The study results show a direct relationship between chocolate intake and increase of breast cancer risk where chocolate intake by cases was higher than controls and this difference was found to be statistically significant and this could have attributed to large quantity intake of chocolate by cases. While honey, jam and Kunafeh intake by cases was higher than controls and was not found to be statistically significant. Similar results were found by Dobson [59] who noticed that women who were reported consuming more sweets, including desserts, sweetened beverages and added

Table 16. Independent t test comparing the means of different spices

Variable	Subject	Number	Mean	SD	t- test	*P value*
Basil	Positive BC	32	0.188	0.109	-2.022	0.047*
	Negative BC	45	0.250	0.149		
Cloves	Positive BC	27	0.122	0.103	-1.738	0.044*
	Negative BC	32	0.169	0.102		
Turmeric	Positive BC	21	0.158	0.091	-2.562	0.013*
	Negative BC	41	0.228	0.107		
Cinnamon	Positive BC	32	0.185	0.211	-1.383	0.171
	Negative BC	39	0.248	0.172		

**Statistically Significant (Significant correlation at 0.05 level)*

Table 17. Independent t test comparing the means of different oils among participants

Variable	Subject	Number	Mean	SD	t	*P value*
Olive oil	Positive BC	60	1.415	0.734	1.535	0.127
	Negative BC	62	1.219	0.679		
Corn oil	Positive BC	23	0.782	0.665	3.950	< 0.001*
	Negative BC	19	0.200	0.216		
Sunflower oil	Positive BC	48	1.052	0.711	7.676	< 0.001*
	Negative BC	54	0.222	0.250		
Butter	Positive BC	31	0.363	0.327	3.678	< 0.001*
	Negative BC	20	0.142	0.057		

**Statistically Significant (Significant correlation at 0.05 level)*

Table 18. Independent t test comparing the means of different sweets

Variable	Subject	Number	Mean	SD	t	*P value*
Honey	Positive	12	0.750	0.376	1.315	0.198
	Negative	21	0.528	0.508		
Chocolate	Positive	39	0.652	0.544	2.624	0.012*
	Negative	42	0.413	0.171		
Kunafeh	Positive	38	0.131	0.169	0.980	0.332
	Negative	19	0.092	0.044		

**Statistically Significant (Significant correlation at 0.05 level)*

sugars, chocolate, honey, candy increase risk of breast cancer. Diets that are high in refined carbohydrates like those found in sweets is associated with higher levels of blood glucose, force the body to release insulin and that insulin encourages cancer cells to grow and could result in higher levels of estrogen, which may promote the development of breast cancer [60,61]

3.8 Physical Activity and Stress Exposure

Table 19 shows that percentage of the participants who were engaged in any physical activity is 29.3% and there is convincing evidence that the true percentage of engaged in any physical activity was 18.7% for cases and 40.0% for control. This result indicates statistically significant difference between cases and control regarding engagement in any physical activity. The collected data in Table 19 show that the majority of participants had done brisk walking (95.5%). Among cases, 85.7% had brisk walking compared to control (100.0%). This result indicates statistically significant difference between cases and control regarding brisk walking. Of the participants 52.0%, were exposed to stress. Among cases, percentage of those who were exposed to stress is (61.3%) which was higher than the control (42.7%). This result indicates statistically significant difference between cases and control regarding exposed to stress (*p=0.017)* (Table 19). Dramatic events were divided into four groups: death of close relative, diseased close relative, home demolished, and husband is not responsible. About 55.1% of participants suffered death of close relative; 36.5% from case and 42.7% from control; but this difference is statistically insignificant.

This agrees with Friedenreich & Cust, [62] study which found an approximately 25% decrease in breast cancer risk among the most physically active women compared with the least active women. The results of the current study show that exposure to stress has a positive association with increase of breast cancer risk where the percentage of cases exposed to stress (61.3%) was significantly higher than controls (42.7%). A study conducted by Antonova et al. [63] has found similar results where stress exposure has been proposed to contribute to the etiology of breast cancer. Stress may also contribute to mammary tumor development by affecting immune system function and the elimination of transformed mammary cells. Alternatively, psychological stress has been demonstrated to modulate DNA repair capacity and to promote mutagenesis. Moreover, our study did not show statistically significant relationship between dramatic events (e.g., death of close relative; diseased close relative; home demolished) and breast cancer. About 55.1% of participants were found to have suffered from death of close relative and this attributed to war on Gaza.

Table 19. Distribution of participants by physical activity

Variable	Positive BC	Negative BC	Total	*P value*
Physical activity	**No (%)**	**No (%)**	**No (%)**	0.003*
Yes	14 (18.7)	30 (40.0)	44 (29.3)	
No	61 (81.3)	45 (60.0)	106 (70.7)	
Total	75 (100.0)	75 (100.0)	150 (100.0)	
Kind of activity	**No (%)**	**No (%)**	**No (%)**	0.048*
Brisk walking	12 (85.7)	30 (100.0)	42 (95.5)	
Others	2 (14.3)	0 (0.0)	2 (4.5)	
Total	14 (100.0)	30 (100.0)	44 (100.0)	
Stress exposure	**No (%)**	**No (%)**	**No (%)**	0.017*
Yes	46 (61.3)	32 (42.7)	78 (52.0)	
No	29 (38.7)	43 (57.3)	72 (48.0)	
Total	75 (100.0)	75 (100.0)	150 (100.0)	
Dramatic events	**No (%)**	**No (%)**	**No (%)**	0.422
Death of close relative	26 (36.5)	17 (53.2)	43 (55.1)	
Diseased close relative	3 (6.5)	6 (18.8)	9 (11.5)	
Home demolished	6 (13.0)	2 (6.3)	8 (10.3)	
Your husband is not responsible	11 (23.9)	7 (21.9)	18 (23.1)	
Total	46 (100.0)	32 (100.0)	78 (100.0)	

**Statistically Significant (Significant correlation at 0.05 level)*

4. CONCLUSION

Study includes multifactorial risks of unhealthy lifestyle in relation to development of breast cancer which include physical inactivity, obesity, high consume of oil and fat, high intake of red meat, low intake of fruit and vegetable, and high exposure to stress.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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