

Original Research Article

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

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 was consisted of 150 participants, conducted in Al-shifa hospital at Gaza Strip. Food frequency questionnaire, Anthropometric, Lipid profile (Cholesterol, HDL, LDL, and Triglyceride) and CBC were detected for cases and controls. SPSS software was used to analyze the obtained data. **Results:** The study revealed that 72% of Breast cancer were >45 years old compare with 53.3% of controls with the same age. 20% of Breast cancer have family history compare with 3% of control. The mean of menarche and marital age for Breast cancer was higher than control. Fertility among cases was lower than control. The mean of parity for breast cancer was 6.83 compare with 6.01 of control. Breastfeeding and duration among controls was significantly higher than Breast cancer. Pills intake and injection hormones among Breast cancer was significantly higher than 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 were eating whole fat dairy product compare with 45.3% of controls. 58.7% of Breast cancer who have eaten vegetable and fruit daily compare with 88% of controls; about 56% of Breast cancer drink less than one liter per day compare with 29.3% of controls. **Conclusion:** The study concluded that breast cancer is less physically active, more obese, consume more oil and fat, more eating red meat, consume fruit and vegetable less frequently, more exposure to stress.

Key words: breast cancer, nutritional factors, dietary behavior

Introduction

Breast cancer was the first leading cause of death among Palestinian woman in 2012 [1]. Good nutrition and healthy life style are important for prevention of breast cancer. Bad dietary habits and unhealthy life style has great impact on health, so nutritional assessment and follow up are essential for reduction risk of breast cancer. Unfortunately, nutritional assessment for the 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 breast 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 had been diagnosed with breast cancer in the previous five years. Since the 2008 estimates, breast cancer incidence 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 estimates suggested that more than millions of new breast cancer cases occurred worldwide annually, with nearly 580,000 cases occurring in developed countries and the remainder in developing countries [2-3].

Nationally, according to the Palestinian Health Information Center (PHIC) and Ministry of Health (MOH) annual reports at 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 at the forefront of cancers that affect the Palestinians and by up to 19% of all new cancer cases recorded in Palestine. The proportion of new cases recorded for breast cancer annually in Palestine is increasing from 11% in 2000 to 19% in 2010, concentrated incidence 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 originating from breast tissue, most commonly from the inner lining of milk ducts or the lobules that supply the ducts with milk. Cancers originating 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 allow implementation of useful strategies for prevention [7].

Nutrition can play an important role in the prevention of breast cancer. Good nutrition may reduce the incidence of breast cancer and the risk of breast cancer progression or recurrence, and also enhances overall quality of life [8].

Eating diet that is 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 are at a healthy body weight and engaging in regular physical activity also play an important role. Also nutrition is an important part of the 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].

Subjects and Methods

Study Design

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

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.

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 was started at the 2nd of February, 2013 and continued until July 25th, 2013.

Eligibility Criteria

Subjects who were eligible to participate in the study were those who met the following criteria.

Inclusion Criteria

Case and Control

- Case was defined as women who were newly diagnosed with breast cancer.
- Control was defined as women free of breast cancer. Controls were cross matched with age of cases (± 5 years).

Exclusion Criteria

Patients with organ failure such as:

- Kidney disease
- Hepatic disease.
- Heart disease
- Other cancer

Data Collection

Interview 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

Food frequency questionnaire was prepared (FFQ). The FFQ investigate the patient food intake and focus on specific groups of foods and their frequency of 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.

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 $BMI = \text{weight (kg)} / \text{height (m)}^2$.

Biochemical Investigations

- The participants fasted 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 the blood was drawn in 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).

Pilot Study and Ethical Consideration

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

Statistical Analysis

Statistical analysis was performed using SPSS program version 19.

Limitation of study

This study has been conducted only in Al Shifa hospital so, results can be generalized on this sector only. Also, shortage of local previous studies has prevented the researcher to discuss and compare the results with these studies.

Results and Discussion

Descriptive analysis showed 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 is increase at age of 50 then declines [1]

Distribution of participants according to their breastfeeding practice

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

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)*

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

Table 2: Two Independent t test between Study Participants and Breastfeeding

Variable	Subject	Number	Mean	SD	T- test	P value
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Duration of Breastfeeding (month)	Positive BC Negative BC	60 73	14.15 17.25	4.210 5.123	-3.754	<0.001*
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*Statistically Significant (Significant correlation at 0.05 level)

These findings agree with the results of Heuch *et al.* (2002) which showed 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 increase prolactin which increases cell proliferation and decreases apoptosis in the breast [2].

Another studies suggest that extended period of breastfeeding during women's life time can reduce breast cancer. Although breastfeeding may be one factor that reduces a woman's risk of breast cancer, it is certainly not the only factor determining her 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].

Distribution of Participants by Anthropometric Measurements

The controls was statistically lighter than the cases. This agree with previous studies have found a positive association between weight gain and increased 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 due to the fact that weight gain reflects mainly an increase in body fat.

The mean BMI for cases was which is greater than the control. The mean of waist circumference for cases was significantly greater than control (figure 3)

Table 3: Independent t test comparing the means of Anthropometric Measurements among Participants

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

*Statistically Significant (Significant correlation at 0.05 level)

This agrees by Haakinson et al (2012) study which found obese patients were more likely to present with disease detected by imaging when compared to nonobese. Obese patients had a large tumors and higher rate of lymph node metastasis [5].

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 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].

Table 4: Independent t test comparing the means of Blood Lipid Profile among Participants

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

LDL-c	Positive BC Negative BC	75 75	127.837 122.739	39.02 39.82	2.345	0.02*
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**Statistically Significant (Significant correlation at 0.05 level)*

Relationship between cases and controls and Iron and Folic Acid Supplement

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

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 reported taking supplementary folic acid (400 µg/d) and a 32% increased 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].

Dietary Behavior

Use of pressurized utensils (Overcooking meat)

The use of pressurized utensils for meat cooking was significantly higher among cases than controls (Table 6) which coincides with Wei Zheng (2009) study results on the associations between intake of high temperature cooked meat and breast cancer risk [10]. Also, this finding agrees with the resulted obtained by Hanf & Gonder, (2005) and Steck et al. (2007) in Finland which revealed a positive association between overcooking meat and breast cancer [11,12].

Cooking Chicken

The study clarified that more than two thirds of cases cooking chicken with skin compare with less than half of the controls (Table 6). And therefore, cooking chicken with skin has a positive association with increased breast cancer risk. A reasonable explanation for such association could be return to that chicken skin typically contains high amounts of fat; and therefore causing weight gain lead to increase levels of endogenous estrogen and may increase the concentration of several circulating cytokines, which stimulate the activities of the enzymes involved in the synthesis of estrogen. Boyd *et al.* (2003) study found 13% increase in breast cancer risk among women with the highest level of fat intake compared with those with the lowest level [13].

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 lacking of association, between type of fish and breast cancer, disagrees with Zheng *et al.* (2013) 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.* (2002) found that high consumption of fish was weakly associated with reduced breast cancer risk, and the association was not statistically significant [14,15].

Type of dairy product

The results of the current study showed that dairy products with whole fat are positively associated with increased breast cancer risk in comparison to skimmed fat dairy products. The current study agrees with the result of Missmer *et al.*, (2002) study which showed 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 the 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 [16].

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 Dairy 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)

Frequency of Dietary Intake

Dairy product intake

The current results revealed that the cases consumed 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].

Vegetable and fruit intake

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

Canned food intake

The results presented in table 7 showed that more than half of cases ate canned food once weekly 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 showed that canned food intake associated with increased 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 increased risk of BC, early puberty in girls, weak immune system and obesity. Furthermore, higher levels of BPA were associated with markers of oxidative stress and inflammation [19].

Drinking water

Regarding water drinking habits, more than one half of cases drank less than one liter of water daily compared with less than one third of control. (Table 7).

Water acts as detoxification agent which remove toxins from body and many research suggest that drinking enough water every day, could reduce risk of developing breast cancer. Forrester *et al.* (2000) study found that good hydration can reduce the risk of

breast cancer by 33 % for premenopausal women and 79 % for postmenopausal women and this agree with the results obtained in the present study which showed that a significant protective effect for drinking water against breast cancer. Cases who drink less than one liter of water per day was (56%) compare with (29.3%) of the controls [20].

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 than2L	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)

Servings of Dietary Intake

Dairy Products Intake

Table 8 showed the means of daily daily yogurt intake by cases was 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 showed 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 a

reduction in the risk of breast cancer through their probiotics content which can help maintaining the balance of bacteria necessary for boost the immune system and stimulate infection-fighting white cells in the bloodstream or due to a factor that has anti-tumor effects. It has 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].

Table 8: Independent t test Comparing the Means of Daily Number of Dairy Products Servings among Study Participant

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)*

Protein Intake

Table 9 revealed that high red meat intake is associated with increased 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 a 12% increase in breast cancer risk was noticed per 50 gram increment of meat intake each day. Red meat are 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].

Table 9 Independent t test comparing the means of Daily Number of Meat, Fishes, Eggs Serving among Participant

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)

Regarding fish intake, the present study showed that fish intake has a significant protective effect against breast cancer risk. Table 9 showed that fish intake among controls was significantly higher than cases and this agrees with the result of Terry *et al.* (2003) 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 [24]. 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 showed 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 contain lower amounts of saturated fats, iron and cholesterol in comparison with red meat.

Finally, the results of the current study showed 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.* (2009). The study found that breast cancer risk was slightly decreased among women who consumed fewer than two eggs per week but slightly increased among women who consumed one or more eggs per day compared to women who did not eat eggs [26].

Vegetable Intake

Table 10 showed revealed no statistically significant association was found between spinach intake and breast cancer risk. However, the results showed 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.* (2010) 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) [27]

High Potatoes intake was associated with increased 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 increased breast cancer risk by affecting insulin resistance and weight again and this agree with several studies conducted by Burley *et al.*, (2010) & Stadler *et al.*, (2002) 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 [28, 29].

Table 10: Independent t test comparing the means of Daily Number of Different Types of Vegetable Serving among Participant

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

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

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].

Regarding garlic intake, the collected data showed that garlic intake among cases was higher than controls and this difference was not statistically significant. This finding disagrees with the results obtained in Lalla *et al.* (2013) 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 behavior in garlic intake. Eating cooked garlic leads to lose active substances (Sulforaphane) during crushing or cooking and thus losing anticancer properties [33]. 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 showed that tomato has a significant protective effect against breast cancer risk and this agree with several studies conducted by Llanos *et al.* (2013) & Masala *et al.* (2012) 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 [34, 35, 36]

The current study revealed 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 showed 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.* (2008) has found an inverse association between breast cancer risk and increasing consumption of Cabbage [38].

Fruits Intake

Table 11 showed 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 showed that cases were consuming more (serving size per day) of apple and banana than controls. Our finding disagree with Hai Liu *et al.*, (2005) & Reagan-Shaw *et al.*, (2010) 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.* (2009) who have found that banana have 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 [39, 40, 41].

Table 11: Independent t test comparing the means of Daily Number of Different Types of Fruits Serving among Participant

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)*

The current study revealed 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.

Grains Intake

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

Table 12 Independent t test comparing the means of Grains Serving among Participant

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

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

Bread, Pasta, Rice, Cuscus, and Biscuits intake were found to be positively associated with increased breast cancer risk in the current study. The collected data revealed 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 increased breast cancer risk and this agree with study conducted on Italian women by Augustin *et al.* (2013) 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 showed

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 [42].

Nuts & Seeds Intake

Table 13 showed means of Nuts & Seeds serving among participant. 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.

Table 13 Independent t test comparing the means of Nuts & Seeds Serving among Participant

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)*

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 showed that pumpkin seeds intake among cases were 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 Cool (2013) who found that eating pumpkin seeds lower the risk of breast cancer by 23% in postmenopausal women [43].

Beverages Intake

Table 14 showed the means of different beverages among participant. Drinking soft drinks, Juices and Fresh juices by cases have significant higher than control. The coffee intake by cases have lower than control.

Table 14. Independent t test comparing the means of different Beverages among Participant

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		
Juices	Positive BC	21	0.578	0.509	2.784	0.01*
	Negative BC	19	0.249	0.173		
Fresh juices	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)*

Drinking of soft drinks, Juices and Fresh juices by cases were significantly higher than controls and therefore are positively associated with the increase in breast cancer risk in the current study and this agree with study by Malik *et al.* (2006) who found that Consumption of sugar-sweetened beverages, particularly carbonated soft drinks, association with increased breast cancer risk. This association could be due to these drinking a key contributor to the epidemic of overweight and obesity, by virtue of these beverages' high added sugar content, low satiety, and incomplete compensation for total energy [44].

The results of the current study showed 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.* (2011) 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.*

(2011) found that coffee drinking was inversely associated with breast cancer risk [45, 46]

Herbs Intake

The table 15 showed means of different Herbs intake among participant. 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.

Table 15 Independent t test comparing the means of different Herbs Intake among Participant

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)*

In the current study, a positive association between Chamomile and Rosemary consumption and the increase in the incidence of breast cancer was found. Chamomile and Rosemary intake by cases were 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 showed 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 agree with the results of Tamir *et al.*

(2002) 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 [47].

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 agree with Elkady *et al.* (2012) 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 [48].

Regarding green vs. black tea intake, the collected data revealed 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.* (2006) who noticed that black tea intake was not related to the decrease in risk of breast cancer and 22% reduction in 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.[49]

Spices Intake

The Table 16 showed means of different spices among participant. 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.

Table 16 Independent t test comparing the means of different Spices among Participant

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)*

The results of this study revealed 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 & Milner (2011) study which found an association between Basil and the reduction in breast cancer [50].

Similarly, cloves was 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; acetyeugenol which have a detoxification effect in the human body. To the best of our knowledge, no studies have been conducted in humans to date to evaluate use of cloves in cancer prevention, a few studies conducted in mice suggest its effectiveness, especially in modifying cellular detoxification processes [50]

Moreover, the results of this study showed 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.* (2011) & Bar-Sela *et al.* (2010) who found curcumin as a chemopreventive and therapeutic agent [51, 52].

Finally, the collected data showed 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.* (2013) study which suggested that the extracts of cinnamon plant have antiangiogenic protective activities in the prevention of breast cancer [53].

Oils Intake

Table 17 showed means of servings of different oils among participant. 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 showed direct relationship between Corn oil and Sunflower oil intake and increased breast cancer and this agree with the results found in a study conducted by Maillard *et al.* (2002). The study found 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 incidence of breast cancer [54].

Table 17: Independent t test comparing the means of different Oils among Participant

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

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

Similarly, butter intake was found to have a positive association with increased breast cancer risk (butter intake by cases was significantly higher than controls). Similar results was found by Jordan *et al.* (2013) 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 incidence of breast cancer by Trichopoulou *et al.* (1995), found that butter appears to be associated with an elevated risk for breast cancer [55, 56].

Finally, no statistically significant association between olive oil intake and breast cancer risk in our study where olive oil intake among cases was higher than controls. Results were found by Alegre *et al.* (2013) 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.* (2013) 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 anticancer activity. This inconsistency could be attributed to olive oil intake among BC patients was during treatment [57, 58].

Sweets Intake

Table 18 showed means of servings of different sweets among participant. 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.

Table 18: Independent t test comparing the means of different Sweets among Participant

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		
Jam	Positive	18	0.714	0.710	1.764	0.094
	Negative	6	0.333	0.334		

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

The study results showed a direct relationship between chocolate intake and increased breast cancer risk where chocolate intake by cases was higher than controls and this difference was found to be statistically significant and this could attributed to large quantity intake of chocolate by cases. While honey, jam and kunafeh intake by cases was higher than controls and was found to be not statistically significant. Similar results were found by Dobson (2005) who noticed that women who reported consuming more sweets, including desserts, sweetened beverages and added sugars, chocolate, honey, candy have increased risk of breast cancer [59]. Diet high in refined carbohydrates like those found in sweets is associated with higher levels of blood glucose, forcing 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]

Physical Activity

Table 19 shows that percentage of the participants who had 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 showed 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..

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)	

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

This agrees with Friedenreich & Cust, (2008) study which found an approximately 25% decrease in breast cancer risk among the most physically active women compared with the least active women [62].

Stress Exposure

52.0%. of the participants exposed to stress. Among cases, percentage of exposed to stress (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 26).

Dramatic Events 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 statistical non-significant.

Table 20 Distribution of Participants by Stress Exposure

Variable	Positive BC	Negative BC	Total	P value
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)*

The results of the current study show that being exposed to stress has a positive association with increased 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.* (2011) 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 [63]. 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 be suffered from death of close relative and this attributed to war on Gaza which causing lose relative.

Conclusion

Study concluded a 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.

References:

1. Weir, R., Day, P., & Ali, W. Risk factors for breast cancer in women. New Zealand Health Technology Assessment (NZHTA) Report. 2007;10(2), i-328.
2. Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50 302 women with breast cancer and 96 973 women without the disease. *The Lancet*. 2002;360(9328), 187-195.
3. Pechlivani, F., & Vivilaki, V. Breastfeeding and breast cancer. *Health Science Journal*. 2012;6(4).
4. Kotsopoulos J, Lubinski J, Salmena L, Lynch HT, Kim-Sing C, Foulkes WD, Ghadirian P, Neuhausen SL, Demsky R, Tung N, Ainsworth P. Breastfeeding and the risk of breast cancer in BRCA1 and BRCA2 mutation carriers. *Breast Cancer Research*. 2012;14(2), 1.
5. Haakinson, D.J., Leeds, S.G., Dueck, A.C., Gray, R.J., Wasif, N., Stucky, C.C.H., Northfelt, D.W., Apsey, H.A. and Pockaj, B. The impact of obesity on breast cancer: a retrospective review. *Annals of surgical oncology*. 2012;19(9), 3012-3018.
6. Laisupasin, P., Thompat, W., Sukarayodhin, S., Sornprom, A., & Sudjaroen, Y. Comparison of serum lipid profiles between normal controls and breast cancer patients. *Journal of laboratory physicians*. 2013;5(1), 38.
7. Peela, J. R., Jarari, A. M., El Saiety, S. O., El Busaifi, S., & Srikumar, S. The relationship between serum lipids and breast cancer in Libya. *Biochemistry & Analytical Biochemistry*, 2012.
8. Smith, A. D., Kim, Y. I., & Refsum, H. Is folic acid good for everyone?. *The American journal of clinical nutrition*. 2008;87(3), 517-533.
9. Larsson, S. C., Giovannucci, E., & Wolk, A. Folate and risk of breast cancer: a meta-analysis. *Journal of the National Cancer Institute*. 2007;99(1), 64-76.

10. Zheng, W., & Lee, S. A. Well-done meat intake, heterocyclic amine exposure, and cancer risk. *Nutrition and cancer*. 2009;61(4), 437-446.
11. Hanf, V., & Gonder, U. Nutrition and primary prevention of breast cancer: foods, nutrients and breast cancer risk. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2005;123(2), 139-149.
12. Steck, Susan E., Mia M. Gaudet, Sybil M. Eng, Julie A. Britton, Susan L. Teitelbaum, Alfred I. Neugut, Regina M. Santella, and Marilie D. Gammon, M. D. Cooked meat and risk of breast cancer—lifetime versus recent dietary intake. *Epidemiology*. 2007;18(3), 373-382.
13. Boyd, N. F., Stone, J., Vogt, K. N., Connelly, B. S., Martin, L. J., & Minkin, S. Dietary fat and breast cancer risk revisited: a meta-analysis of the published literature. *British journal of cancer*. 2003;89(9), 1672-1685.
14. Zheng, J. S., Hu, X. J., Zhao, Y. M., Yang, J., & Li, D. Intake of fish and marine n-3 polyunsaturated fatty acids and risk of breast cancer: meta-analysis of data from 21 independent prospective cohort studies; 2013.
15. Terry, P., Jain, M., Miller, A. B., Howe, G. R., & Rohan, T. E. Dietary carotenoids and risk of breast cancer. *The American journal of clinical nutrition*. 2002;76(4), 883-888.
16. Missmer, S.A., Smith-Warner, S.A., Spiegelman, D., Yaun, S.S., Adami, H.O., Beeson, W.L., Van Den Brandt, P.A., Fraser, G.E., Freudenheim, J.L., Goldbohm, R.A. and Graham, S. Meat and dairy food consumption and breast cancer: a pooled analysis of cohort studies. *International journal of epidemiology*. 2002;31(1), 78-85.
17. Moorman, P. G., & Terry, P. D. Consumption of dairy products and the risk of breast cancer: a review of the literature. *The American journal of clinical nutrition*. 2004;80(1), 5-14.
18. Holmes, M. D., & Willett, W. C. Does diet affect breast cancer risk?. *Breast Cancer Research*. 2004;6(4), 1.
19. Kopelson, K. Risky appeals: recruiting to the environmental breast cancer movement in the age of “pink fatigue”. *Rhetoric Society Quarterly*. 2013;43(2), 107-133.
20. Woolcott, C. G., King, W. D., & Marrett, L. D. Coffee and tea consumption and cancers of the bladder, colon and rectum. *European journal of cancer prevention*. 2002;11(2), 137-145.

21. Maroof, H., Hassan, Z. M., Mobarez, A. M., & Mohamadabadi, M. A. Lactobacillus acidophilus could modulate the immune response against breast cancer in murine model. *Journal of clinical immunology*. 2012;32(6), 1353-1359.
22. Moorman, P. G., & Terry, P. D. Consumption of dairy products and the risk of breast cancer: a review of the literature. *The American journal of clinical nutrition*. 2004;80(1), 5-14.
23. Taylor, E. F., Burley, V. J., Greenwood, D. C., & Cade, J. E. Meat consumption and risk of breast cancer in the UK Women's Cohort Study. *British journal of cancer*. 2007;96(7), 1139-1146.
24. Terry, P. D., Rohan, T. E., & Wolk, A. Intakes of fish and marine fatty acids and the risks of cancers of the breast and prostate and of other hormone-related cancers: a review of the epidemiologic evidence. *The American journal of clinical nutrition*. 2003;77(3), 532-543.
25. Aronson, K.J., Miller, A.B., Woolcott, C.G., Sterns, E.E., McCready, D.R., Lickley, L.A., Fish, E.B., Hiraki, G.Y., Holloway, C., Ross, T. and Hanna, W.M. Breast adipose tissue concentrations of polychlorinated biphenyls and other organochlorines and breast cancer risk. *Cancer epidemiology biomarkers & prevention*. 2000;9(1), 55-63.
26. Pala, V., Krogh, V., Berrino, F., Sieri, S., Grioni, S., Tjønneland, A., Olsen, A., Jakobsen, M.U., Overvad, K., Clavel-Chapelon, F. and Boutron-Ruault, M.C. Meat, eggs, dairy products, and risk of breast cancer in the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort. *The American journal of clinical nutrition*. 2009; 90(3), 602-612.
27. Boggs, D. A., Palmer, J. R., Wise, L. A., Spiegelman, D., Stampfer, M. J., Adams-Campbell, L. L., & Rosenberg, L. Fruit and vegetable intake in relation to risk of breast cancer in the Black Women's Health Study. *American journal of epidemiology*. 2010;172(11), 1268-1279.
28. Burley, V.J., Greenwood, D.C., Hepworth, S.J., Fraser, L.K., de Kok, T.M., van Breda, S.G., Kyrtopoulos, S.A., Botsivali, M., Kleinjans, J., McKinney, P.A. and Cade, J.E. Dietary acrylamide intake and risk of breast cancer in the UK women's cohort. *British journal of cancer*. 2010;103(11), 1749-1754.
29. Stadler, R.H., Blank, I., Varga, N., Robert, F., Hau, J., Guy, P.A., Robert, M.C. and Riediker, S. Food chemistry: acrylamide from Maillard reaction products. *Nature*. 2002;419(6906), 449-450.

- 896 30. Herman-Antosiewicz, A., & Singh, S. V. Signal transduction pathways leading to
897 cell cycle arrest and apoptosis induction in cancer cells by Allium vegetable-
898 derived organosulfur compounds: a review. *Mutation Research/Fundamental and*
899 *Molecular Mechanisms of Mutagenesis*. 2004;555(1), 121-131.
900
- 901 31. Lalla, J. K., Ogale, S., Shah, V. G. M., & Parmar, D. INTERNATIONAL
902 JOURNAL OF PHARMACEUTICAL, CHEMICAL AND BIOLOGICAL
903 SCIENCES; 2010.
904
- 905 32. Slimestad, R., Fossen, T., & Vågen, I. M. Onions: a source of unique dietary
906 flavonoids. *Journal of agricultural and food chemistry*. 2007;55(25), 10067-
907 10080.
908
- 909 33. Link, L. B., & Potter, J. D. Raw versus cooked vegetables and cancer
910 risk. *Cancer Epidemiology Biomarkers & Prevention*. 2004;13(9), 1422-1435.
911
- 912 34. Llanos, A. A., Peng, J., Pennell, M. L., Krok, J. L., Vitolins, M. Z., Degraffinreid,
913 C. R., & Paskett, E. D. Effects of tomato and soy on serum adipokine
914 concentrations in postmenopausal women at increased breast cancer risk: a cross-
915 over dietary intervention trial. *The Journal of Clinical Endocrinology &*
916 *Metabolism*. 2014;99(2), 625-632.
917
- 918 35. Masala, G., Assedi, M., Bendinelli, B., Ermini, I., Sieri, S., Grioni, S., Sacerdote,
919 C., Ricceri, F., Panico, S., Mattiello, A. and Tumino, R. Fruit and vegetables
920 consumption and breast cancer risk: the EPIC Italy study. *Breast cancer research*
921 *and treatment*. 2012;132(3), 1127-1136.
922
- 923 36. Friedman, M. Anticarcinogenic, cardioprotective, and other health benefits of
924 tomato compounds lycopene, α -tomatine, and tomatidine in pure form and in
925 fresh and processed tomatoes. *Journal of agricultural and food chemistry*.
926 2013;61(40), 9534-9550.
927
- 928 37. Moorjani, A. *Dying to be me: My journey from cancer, to near death, to true*
929 *healing*. Hay House, Inc; 2012.
930
- 931 38. Lee, S.A., Fowke, J.H., Lu, W., Ye, C., Zheng, Y., Cai, Q., Gu, K., Gao, Y.T.,
932 Shu, X.O. and Zheng, W. Cruciferous vegetables, the GSTP1 Ile105Val genetic
933 polymorphism, and breast cancer risk. *The American journal of clinical nutrition*.
934 2008;87(3), 753-760.
935
- 936 39. Liu, R. H., Liu, J., & Chen, B. Apples prevent mammary tumors in rats. *Journal*
937 *of agricultural and food chemistry*. 2005;53(6), 2341-2343.
938

- 939 40. Reagan-Shaw, S., Eggert, D., Mukhtar, H., & Ahmad, N. (2010). Antiproliferative
940 effects of apple peel extract against cancer cells. *Nutrition and cancer*, 62(4), 517-
941 524.
- 942 41. Zhang, C. X., Ho, S. C., Chen, Y. M., Fu, J. H., Cheng, S. Z., & Lin, F. Y. Greater
943 vegetable and fruit intake is associated with a lower risk of breast cancer among
944 Chinese women. *International journal of cancer*. 2009;125(1), 181-188.
945
- 946 42. Augustin, L.S.A., Dal Maso, L., La Vecchia, C., Parpinel, M., Negri, E.,
947 Vaccarella, S., Kendall, C.W.C., Jenkins, D.J.A. and Franceschi, S. Dietary
948 glycemic index and glycemic load, and breast cancer risk: a case-control study.
949 *Annals of Oncology*. 2001;12(11), 1533-1538.
950
- 951 43. Saha, P., Mazumder, U. K., Haldar, P. K., Naskar, S., Kundu, S., Bala, A., & Kar,
952 B. Anticancer activity of methanol extract of Cucurbita maxima against Ehrlich
953 as-cites carcinoma. *International Journal of Research in Pharmaceutical*
954 *Sciences*. 2011;2(1), 52-59.
955
- 956 44. Malik, V. S., Schulze, M. B., & Hu, F. B. Intake of sugar-sweetened beverages
957 and weight gain: a systematic review. *The American journal of clinical nutrition*.
958 2006;84(2), 274-288.
959
- 960 45. Fagherazzi, G., Touillaud, M. S., Boutron-Ruault, M. C., Clavel-Chapelon, F., &
961 Romieu, I. No association between coffee, tea or caffeine consumption and breast
962 cancer risk in a prospective cohort study. *Public health nutrition*. 2011;14(07),
963 1315-1320.
964
- 965 46. Yu, X., Bao, Z., Zou, J., & Dong, J. Coffee consumption and risk of cancers: a
966 meta-analysis of cohort studies. *BMC cancer*. 2011;11(1), 1.
967
- 968 47. Tamir, S., Eizenberg, M., Somjen, D., Stern, N., Shelach, R., Kaye, A., & Vaya,
969 J.. Estrogenic and antiproliferative properties of glabridin from licorice in human
970 breast cancer cells. *Cancer research*. 2000;60(20), 5704-5709.
971
- 972 48. Elkady, A. I., Abuzinadah, O. A., Baeshen, N. A., & Rahmy, T. R. Differential
973 control of growth, apoptotic activity, and gene expression in human breast cancer
974 cells by extracts derived from medicinal herbs Zingiber officinale. *Journal of*
975 *BioMed Research*, 2012.
976
- 977 49. Sun, C. L., Yuan, J. M., Koh, W. P., & Mimi, C. Y. Green tea, black tea and
978 breast cancer risk: a meta-analysis of epidemiological studies. *Carcinogenesis*.
979 2006;27(7), 1310-1315.
980
- 981 50. Kaefer, C. M., & Milner, J. A. Herbs and spices in cancer prevention and
982 treatment; 2011.

51. Wilken, R., Veena, M. S., Wang, M. B., & Srivatsan, E. S. Curcumin: A review of anti-cancer properties and therapeutic activity in head and neck squamous cell carcinoma. *Molecular cancer*. 2011;10(1), 1.
52. Bar-Sela, G., Epelbaum, R., & Schaffer, M. Curcumin as an anti-cancer agent: review of the gap between basic and clinical applications. *Current medicinal chemistry*. 2010;17(3), 190-197.
53. Madkor, H. R., Mansour, S. W., & Khalil, M. A. Antiangiogenic activities of cinnamon, black and green tea extracts on experimentally induced breast cancer in rats. *Asian Journal of Biochemistry*. 2012;7(4), 206-217.
54. Maillard, V., Bougnoux, P., Ferrari, P., Jourdan, M.L., Pinault, M., Lavillonnière, F., Body, G., Le Floch, O. and Chajès, V. N-3 and N-6 fatty acids in breast adipose tissue and relative risk of breast cancer in a case-control study in Tours, France. *International Journal of Cancer*. 2002;98(1), 78-83.
55. Jordan, I., Hebestreit, A., Swai, B., & Krawinkel, M. B. Dietary patterns and breast cancer risk among women in northern Tanzania: a case-control study. *European journal of nutrition*. 2013;52(3), 905-915.
56. Trichopoulou, A., Katsouyanni, K., Stuver, S., Tzala, L., Gnardellis, C., Rimm, E., & Trichopoulos, D. Consumption of olive oil and specific food groups in relation to breast cancer risk in Greece. *Journal of the National Cancer Institute*. 1995;87(2), 110-116.
57. Alegre, M. M., Knowles, M. H., Robison, R. A., & O'Neill, K. L. Mechanics behind breast cancer prevention-focus on obesity, exercise and dietary fat. *Asian Pac J Cancer Prev*. 2013;14(4), 2207-2212.
58. Hassan, Z. K., Elamin, M. H., Omer, S. A., Daghestani, M. H., Al-Olayan, E. S., Elobeid, M. A., & Virk, P. Oleuropein induces apoptosis via the p53 pathway in breast cancer cells. *Asian Pacific Journal of Cancer Prevention*. 2013;14(11), 6739-6742.
59. Dobson, R. Sweet foods increase breast cancer risk. *BMJ*. 2005;331(7525), 1102.
60. Jain, R., Strickler, H. D., Fine, E., & Sparano, J. A. Clinical studies examining the impact of obesity on breast cancer risk and prognosis. *Journal of mammary gland biology and neoplasia*. 2013;18(3-4), 257-266.
61. Llanos, A.A., Krok, J.L., Peng, J., Pennell, M.L., Olivo-Marston, S., Vitolins, M.Z., DeGraffinreid, C.R. and Paskett, E.D. Favorable effects of low-fat and low-carbohydrate dietary patterns on serum leptin, but not adiponectin, among

- 1023 overweight and obese premenopausal women: a randomized trial. Springerplus.
1024 2014;3(1), 1.
1025
1026 62. Friedenreich, C. M., & Cust, A. E. Physical activity and breast cancer risk: impact
1027 of timing, type and dose of activity and population subgroup effects. British
1028 journal of sports medicine. 2008; 42(8), 636-647.
1029
1030 63. Antonova, L., Aronson, K., & Mueller, C. R. Stress and breast cancer: from
1031 epidemiology to molecular biology. Breast cancer research. 2011;13(2), 1.
1032
1033
1034
1035