

## **Breast Cancer and Selected Lifestyle Variables: A Case-Control Study**

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**Objective:** To determine the association between selected lifestyle risk factors and breast cancer.

**Setting:** Al-Sadar Teaching Hospital and the Oncology Centre, University of Basrah.

**Design:** Case control study.

**Method:** One hundred and thirty-four women with histologically proven breast cancer were included in the study. The controls were 269 women who were apparently healthy and without any evidence of breast cancer. Cases and controls were group matched for age and place of residence. The study lasted from 1<sup>st</sup> of January to 30<sup>th</sup> of October 2006. Special questionnaire was designed for the study.

**Result:** In the study, the following factors had significant association with the risk of breast cancer: level of education, early menarche, older age at the birth of the first child, abstinence of breast feeding, lack of consumption of fruits and vegetables and consumption of animal fat.

**Conclusion:** The study recommends early detection of breast cancer within the framework of a comprehensive cancer control program, encourage breast feeding for a period of 1-2 years, promotion of healthy diet, low animal fat intake, low carbohydrate and increase intake of fruit and vegetable and promotion of physical activity program.

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Cancer is a health problem. The incidence of it is increasing at alarming pace in developing countries. Breast cancer is one of the leading cancers among the population and in particular among females. Numerous risk factors are implicated in the etiology of breast cancer: age, female sex, hereditary, positive family history, reproductive factors, radiation and life style risk factors, such as, consumption of fatty diet and carbohydrates; in addition, to meager consumption of vegetables and fruits<sup>1-4</sup>.

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Worldwide, the life long risk among women is breast cancer is 10%. It is the second most common cause of cancer-death in women<sup>1</sup>.

Evidence from local studies suggested that breast cancer was increasing in incidence among females in the past few decades. Al-Badri reported an incidence rate of about 5 per 100000 in 1996<sup>5</sup>.

Other risk factors, such as, person's age or race, cannot be changed (non-modifiable), others are related to personal choices such as smoking, drinking alcohol, and diet (modifiable). The risk of breast cancer could be changed with time, due to factors, such as, aging or lifestyle<sup>6</sup>.

The incidence of breast cancer increases with age, doubling nearly every 10 years until the menopause when the rate slows dramatically<sup>1</sup>. Female sex is a major risk factor for breast cancer<sup>2</sup>. Recent studies have shown that about 5% to 10% of breast cancer cases are hereditary because of gene changes (mutations)<sup>6</sup>. Having one first-degree relative (mother, sister or daughter) with breast cancer approximately doubles a woman's risk, and having two first degree relatives increases her risk 5 folds<sup>6</sup>. Single and nulliparous married women have a relative risk rate of 1.4 compared to parous women<sup>2</sup>.

Women whose menarche starts before the age of 12 have a relative risk of 2.3 compared to those after 12. The risk decreases as the age of onset of menstruation increases<sup>2</sup>. Women who have menopause after the age of 55years are twice as likely to develop breast cancer as women who experience the menopause before the age of 45 years<sup>7</sup>. Several studies have provided very strong data that induced abortions have no overall effect on the risk of breast cancer<sup>6</sup>.

High intake of animal fat especially from red meat and high-fat dairy products during premenopausal years is associated with an increased risk of breast cancer<sup>3</sup>. Women who consumed the highest amounts of fruits and vegetables were 3-9% less likely to develop breast cancer<sup>8</sup>. A diet high in carbohydrates may be linked to an increased risk of breast cancers<sup>4</sup>.

No study suggested that today's low dose combined oral contraceptives pose a cancer risk in any population<sup>9</sup>. Two case control studies were done in Basrah in 1996 and 2004 found that there was no association between the use of oral contraceptive pills and development of breast cancer<sup>10,11</sup>.

Breast feeding may decrease the risk of breast cancer, especially if breast feeding is continued for 1.5 to 2 years. Other studies found no impact on breast cancer risk<sup>6</sup>.

Some studies have shown that a high body mass index was positively related with breast cancer among post menopausal women<sup>12,13</sup>.

A study done in Basrah in 1996 had shown that high body mass index was not related to breast cancer<sup>10</sup>. On the other hand, another case control study was done in Basrah in 2004 showed significant association between increase body mass index and risk of breast cancer<sup>11</sup>.

Physical activity is modifiable risk factor through which women can reduce their risk for breast cancer. Reducing risk for breast cancer may be one additional reason to adopt an active lifestyle<sup>14</sup>.

Most studies have found no link between active cigarette smoking and breast cancer<sup>6</sup>.

The aim of the study is to evaluate the association between breast cancer and selected life style risk factors.

## METHOD

One hundred and thirty-four newly diagnosed, histopathologically confirmed breast cancer cases were included. Age and residence matched controls (269) were included. The controls were women without clinical evidence of breast cancer at the time of the study. The controls were recruited from outpatient department. A special questionnaire form was used. The questionnaire included the following: age, place of residence, occupation, education, menstrual history, reproductive history, family history of breast cancer, history of smoking, physical activity and pattern of diet. The data were analyzed in the computer by SPSS program for statistical analysis.

## RESULT

The study showed comparable distribution of age and place of residence among cases and controls, no statistical significant difference ( $p>0.05$ ), which reflects successful matching.

The majority of cases (83.6%) and controls (90.0%) were housewives, but the percentage of employed women was higher among cases than controls (16.4% vs. 10.0%); the difference was not statistically significant ( $p>0.05$ ), OR=0.57 and (CI=0.31-1.04).

The study shows nearly comparable distribution of cases and controls at lower educational level, but it shows that (6%) of cases had higher education compared to (10%) of controls, statistically significant difference ( $p<0.05$ ) and OR was 1.8.

Table 1 shows that 8.2% of cases had their first menarche at age 10-11 years compared to 5.6% among controls, the difference was statistically significant ( $p<0.05$ ).

**Table 1: Menstrual History of Cases and Controls**

Age at menarche	Cases (Number and %)		Controls (Number and %)		OR	CI
10-11	11	8.2	15	5.6	0.6	0.26-1.38
12-13	71	53.0	208	77.3	0.3	0.4 -0.9
14 and above	52	38.8	46	17.1	1	
Total	134	100.0	269	100.0		
$\chi^2 = 25.94$ d.f=2 $p<0.05$						
Age at menopause	Cases (Number and %)		Controls (Number and %)		OR	CI
<40	2	4.2	5	4.5	1	
40-44	4	8.3	4	3.6	2.5	0.3- 1.8
45-49	8	16.7	28	25.2	0.7	0.11- 4.2
50 and above	34	70.8	74	66.7	1.2	0.6 – 6.5
Total	48	100.0	111	100.0		
$\chi^2 = 2.67$ d.f=1 $p>0.05$						

For the calculation of the chi-squared test, age at menopause for the first 2 rows was summed up.

Table 1 shows that 70.8% of cases who was at the post menopausal age had their menopause at 50 years or above compared to 66.7% among controls, the difference was not significant statistically ( $p>0.05$ ).

Nearly 15% of cases were nulliparous compared to 10% of controls, 45.5% of cases had their first child between 20-29 years and 6.8% had their first child at 30-39 years compared to 33.5% and 5.2% among controls respectively, the association was statistically significant ( $p<0.01$ ).

The majority of cases and controls had no history of induced abortion (96.3% and 97.8%), the difference was not significant statistically ( $p>0.05$ ), OR 1.7 and (CI=0.51-5.7).

Table 2 shows that 28.4% of cases had no history of breast feeding compared to 19.3% of controls and the difference was statistically significant ( $p<0.05$ ), OR was 1.7 and (CI=1.02-2.7).

It is evident that the majority of cases and controls did not use oral contraceptive pills, 72.4 % and 66.5%, respectively, but the percentage of women used oral contraceptive pills was higher among controls than cases, 33.5% vs. 27.6% respectively, the difference was not significant statistically ( $p>0.05$ ), OR was 1.31 and (CI=0.84-2.08), see Table 2.

Table 3 shows the distribution of cases and controls according to family history, it shows comparable distribution of cases and controls with no statistically significant difference ( $p>0.05$ ), OR was 1.1 and (CI=0.42- 2.79).

Cigarette smoking active or passive did not have significant effect on the risk of breast cancer, see Table 4.

Table 5 shows that women with breast cancer were less likely than controls to practice moderate or heavy physical activity, the OR=1.36 but the different was not statistically significant ( $p>0.05$ ).

Table 6 shows the pattern of consumption of selected diets among breast cancer cases and controls. Cases were significantly more likely to consume animal fat than controls ( $p<0.01$ ), less likely to consume vegetables and fruits ( $p<0.01$ ) but did not differ significantly from controls in the pattern of carbohydrates consumption ( $p>0.05$ ).

No association could be quantified between nutritional status as indicated by body mass index and the risk of breast cancer, see Table 7. No association could be found between waist hip ratio and the risk of breast cancer, see Table 8.

In order to determine the relative share of different risk factors to the probability of cancer in cases, a logistic regression analysis was done. It was found that six variables could predict significant association with breast cancer. These are: education, occupation animal fat, carbohydrate, fruits, vegetable and waist hip ratio.

**Table 2: Reproductive History of Cases and Controls**

Reproductive factors	Cases (Number and %)		Controls (Number and %)		OR	CI
<u>Age at first child birth</u>						
Nulliparous	20	14.9	27	10.0	2.3	1.2–4.6
10-19	44	32.8	138	51.3	1	
20-29	61	45.5	90	33.5	2.1	1.3–3.3
30-39	9	6.8	14	5.2	1.8	1.2–2.7
Total	134	100.0	269	100.0		
$\chi^2=12.42$	<b>d.f=3</b>	<i>p&lt;0.01</i>				
<u>Parity</u>						
Nulliparous	20	14.9	27	10.0	1.5	0.7–3.1
1-3	41	30.6	86	32.0	0.9	0.5–1.2
4-7	41	30.6	91	33.8	0.9	0.5–1.2
8 & above	32	23.9	65	24.2	1	
Total	134	100.0	269	100.0		
$\chi^2=0.102$	<b>d.f=2</b>	<i>p&gt;0.05</i>				
<u>Induced abortion</u>						
At least one	5	3.7	6	2.2		
None	129	96.3	263	97.8		
Total	134	100.0	269	100.0		
$\chi^2=0.76$	<b>d.f=1</b>	<i>p&gt;0.05</i>	<b>OR=1.7</b>	<b>CI=0.51-5.7</b>		
<u>Breast feeding</u>						
Absent	38	28.4	52	19.3		
Present	96	71.6	217	80.7		
Total	134	100.0	269	100.0		
$\chi^2=4.2$	<b>d.f=1</b>	<i>p&lt;0.05</i>	<b>OR=1.7</b>	<b>CI=1.02-2.7</b>		
<u>Use of oral contraceptive pills</u>						
Never used	97	72.4	179	66.5		
Ever use	37	27.6	90	33.5		
Total	134	100.0	269	100.0		
$\chi^2=1.41$	<b>d.f=1</b>	<i>p&gt;0.05</i>	<b>OR=1.31</b>	<b>CI=0.84-2.08</b>		

**Table 3: Family History of Breast Cancer among Cases and Controls**

Family history	Cases (Number and %)		Controls (Number and %)	
Positive family history	7	5.2	13	4.8
Negative family history	127	94.8	256	95.2
Total	134	100.0	269	100.0
$\chi^2=0.03$	d.f=1	$p>0.05$	OR=1.1	CI=0.42-2.79

**Table 4: Smoking among Cases and Controls**

Smoking	Cases (Number and %)		Controls (Number and %)	
<u>a. Active smoking:</u>				
Not exposed	132	98.5	254	94.4
Exposed	2	1.5	15	5.6
Exact fisher test	$p>0.05$	OR=0.26	CI=0.23-0.29	
<u>b. Passive smoking:</u>				
Not exposed	62	46.3	136	49.1
Exposed	72	53.7	133	50.9
Total	134	100.0	269	100.0
$\chi^2=0.66$	d.f=1	P>0.05	OR=0.84	CI=0.56-1.28

For active smoking: Exact Fisher Test  $p>0.05$  Odds Ratio=0.26 CI=0.23-0.29  
 For passive smoking:  $X^2=0.66$  df=1  $p>0.05$  OR=0.84 CI=0.56-1.28

**Table 5: Physical Activity of Cases and Controls**

Physical activity	Cases (Number and %)		Controls (Number and %)	
Mild physical activity	100	74.6	184	68.4
Moderate and heavy physical activity	34	25.4	85	31.6
Total	134	100.0	269	100.0
$\chi^2=1.67$	d.f=1	$p>0.05$	OR=1.36	CI=0.85-2.17

**Table 6: Pattern of Consumption of Selected Diets**

	<b>Cases (Number and %)</b>		<b>Controls (Number and %)</b>	
<b>Consumption of animal fat</b>				
Regular	104	77.6	168	62.5
Occasional	30	22.4	101	37.5
Total	134	100.0	269	100.0
$\chi^2=9.37$ <b>d.f=1</b> <i>p</i> <0.01 <b>OR=2.08</b> <b>CI=1.3-3.4</b>				
<b>Consumption of carbohydrate</b>				
Regular	107	79.9	229	85.1
Occasional	27	20.1	40	14.9
Total	134	100.0	269	100.0
$\chi^2=1.8$ <b>d.f=1</b> <i>p</i> >0.05 <b>OR=0.69</b> <b>CI=0.40-1.19</b>				
<b>Consumption of vegetables and fruits</b>				
Regular	3	2.2	37	13.8
Occasional	131	97.8	232	86.2
Total	134	100.0	269	100.0
$\chi^2=13.27$ <b>d.f=1</b> <i>p</i> <0.01 <b>OR=7.0</b> <b>CI=2.11-23.03</b>				

**Table 7: Body Mass Index of Cases and Controls**

<b>Body mass Index</b>	<b>Cases (Number and %)</b>		<b>Controls (Number and %)</b>		<b>OR</b>	<b>CI</b>
< 18.5	3	2.2	14	5.2	1	
18.5-24.9	27	20.2	49	18.2	2.6	0.7-9.5
25- 30	63	47.0	112	41.6	2.6	0.7-9.4
31-40	38	28.4	86	32.0	2	0.5-7.3
40 & above	3	2.2	8	3.0	1.7	0.3-10.3
Total	134	100.0	269	100.0		
$\chi^2=3.2$ <b>d.f=4</b> <i>p</i> >0.05						

For the calculation of chi-squared test, body mass index was summed up to < 25 and > 25.

**Table 8: Waist-hip Ratio of Cases and Controls**

Waist-hip ratio	Cases		Controls	
	(Number and %)		(Number and %)	
< 0.79	12	9.0	21	7.8
0.80 and above	122	91.0	248	92.2
Total	134	100.0	269	100.0
$\chi^2=0.16$	d.f=1	$p>0.05$	OR=1.2	CI=0.6-2.5

## DISCUSSION

Breast cancer is common cancer among women. The estimated annual incidence of breast cancer worldwide is about one million cases<sup>15</sup>.

Breast cancer is the most common type of malignancy<sup>4</sup>. Because of the rising global incidence, morbidity and mortality from breast cancer, the search for etiological factors of the disease was intensified. While international variation in the incidence of the disease may implicate a role for environmental factors, available evidence indicates that lifetime estrogen exposure may be a critical factor in breast cancer. Increasing age and sex are well-recognized risk factors. Reproductive characteristics such as age at menarche and menopause, age at first child, parity and breast feeding have also been linked to breast carcinogenesis. Appreciating relevant risk factors for breast cancer in the population is central to any prevention and control program aimed at reducing the burden of the disease through the design and implementation of culturally sensitive interventions<sup>16,17</sup>.

This study showed that the percentage of women with higher education was higher among controls than cases; this could be explained that the highly educated women were more aware about their diet, physical activity or early detection of the disease, this is similar to a study about education and risk of breast cancer in the Norwegian-Swedish women's<sup>17</sup>.

The effect of cigarette smoking and the risk of breast cancer is controversial, most of the studies showed little or no effect<sup>18</sup>.

In this study, it was found that there was no significant association between passive smoking and breast cancer, this is comparable to other studies<sup>19,20</sup>. This study, showed reduced risk of breast cancer among smokers, this could be due to its effect as an anti-estrogenic mechanism<sup>19</sup>. Other studies found a causal relation between active and passive smoking and breast cancer<sup>21</sup>.

The human diet contains a great variety of natural and chemical carcinogens and anti-carcinogens. Some of these compounds may generate free oxygen radicals, which can lead to DNA damage, or other deleterious components<sup>22</sup>.

In this study, it was found that animal fat was a risk factor for breast cancer; this is similar to other studies<sup>23,24</sup>.

Carbohydrate diet may be a risk factor for breast cancer by their effect on body insulin pathway leading to increased level of a protein called IGF-1, which may be related to an increase risk of breast cancer<sup>11</sup>. In the present study, there was no association between breast cancer and carbohydrate consumption, which is similar to other studies from Mexico and



USA<sup>11</sup>. The wide variation in the result might be due to the difference in the quantitative measurement of the amount of carbohydrate.

The intake of fruits has been thought to protect against breast cancer because fruits and vegetables are rich source of natural anti-oxidant. In this study, it was found that women whose diet lack fruit and vegetable were at risk of developing breast cancer nearly 7 times than those who had high consumption; it is similar to other studies, which showed significant association between breast cancer and low consumption of fruit and vegetable<sup>24,25</sup>. On the other hand, a study in Netherlands 2005 suggested that there was no significant reduction in breast cancer risk associated with fruit and vegetable consumption<sup>26</sup>.

It is biologically plausible for physical activity to decrease breast cancer risk, however, epidemiologic studies have yield inconsistent finding<sup>27</sup>. Physical activity may reduce the risk by delaying the onset of menarche and modifying the bioavailability of hormone levels<sup>28</sup>.

In this study, no significant association between breast cancer and physical activity was found, which was dissimilar to other studies from Jordan and USA<sup>19,28</sup>. In the meantime, it was similar to others<sup>20</sup>.

Obesity and weight gain increase breast cancer risk<sup>29</sup>. In the present study, no significant association between breast cancer and body mass index was found.

Other studies showed high risk of breast cancer among women with high body mass index<sup>19,20</sup>.

The logistic regression analysis shows the factors which have significant association are (education, occupation, animal fat, carbohydrate, fruits and vegetables and waist hip ratio), other factors had less association (age at menarche, age at first child birth, breast feeding).

## CONCLUSION

**The study recommends early detection of breast cancer within the framework of a comprehensive cancer control program, encourage breast feeding for a period of 1-2 years, promotion of healthy diet, low animal fat intake, low carbohydrate and increase intake of fruit and vegetable and promotion of physical activity program.**

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