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Association between of BMI and Blood Groups with Breast Cancer Incidence among Women of West Iran: A Case-control Study

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Abstract **Background:** Breast cancer accounts about one fifth of all female malignancy. This cancer is the leading cause of death in high income countries and second leading cause in low and middle income countries. The aim of study is to evaluate a number of factors in the patients of breast cancer compared to controls in West Iran and correlation of them with breast cancer incidence. **Patients and Methods:** In 2014, 76 patients with breast cancer and invasive ductal carcinoma (cases) and 81 age and sex matched-controls randomly were interred to our study. We compared blood groups, BMI, age at the first menarche and hypertension in both groups. **Results**: In case group, the frequency of A^+, O^+, B^+ and AB^+ was 40.8%, 28.9%, 14.5% and 9.2%, respectively. Also, the frequency of A^-, B^-, AB^-, O^- with each other was 6.5%. In control group, A^+, O^+, B^+ and AB^+ was 27.2%, 34.6%, 21% and 8.6%, respectively. The frequency of BMI in two groups was almost similar. Of 76 patients, 13.2% had hypertension and also of 81 controls, 16% had hypertension. The mean age t the first menarche for cases was 13.75 years and for controls was 13.77 years. There was significant correlation between of these variables with breast cancer incidence (P>0.05). **Conclusions**: Blood groups, BMI, age at the first menarche and hypertension are not singly risk factors for breast cancer incidence, but probably combination of them can increases breast cancer incidence. In our opinion, the link between of breast cancer and listed variables is unexplained.

Keywords: *blood group, BMI, breast cancer, case-control study*

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1. Introduction

Breast cancer (BC) is the most frequent malignancy among women that can be a leading cause of death through middle-aged women [1]. This cancer accounts about one fifth of all female malignancy. BC is the leading cause of death in high income countries and second leading cause in low and middle income countries [2]. The known most important determinant factors for BC included: age, family history, genetics, personal history of breast cancer, radiation to chest/face before age 30, race/ethnicity, being overweight, pregnancy/breast feeding and menstrual history, using hormone replacement therapy (HRT), drinking alcohol, having dense breast, lack of exercise, and smoking [3]. Differences in cultures, habits, and ethnicity in many countries from Eastern Mediterranean Region (such as Iran, Tunisia, Pakistan) show that BC diagnosis age is younger than other parts of the world [4]. Also, the stage of diagnosed BC in some countries in Eastern Mediterranean Region is highest than the other regions which can be due to lack of knowledge about BC screening [5].

The aim of study is to evaluate a number of factors in the patients of BC compared to controls in West Iran and correlation of them with BC incidence.

2. Patients and Methods

In 2014, 76 patients with BC and invasive ductal carcinoma (cases) and 81 age and sex matched-controls (there was no history of any type of illness in them such as cancer, cardiovascular diseases, diabetes and etc) randomly were interred to our study. We compared blood groups (A^+, A^-, B^+, B^-, AB^+, AB^-, O^+ and O^-), BMI, age at the first menarche and hypertension in both groups. Also, we survived correlation between of BMI in the patients before and after treatment. P-value was measured by IBM SPSS statistics version 19 and by Chi square Test for correlation of between of blood groups or BMI in case and control groups and Paired T-test for correlation of between

of BMI in patients (before and after treatment). P-value <0.05 was statistically significant.

3. Results

The Table 1 shows the frequency of blood groups in cases and controls. In case group, the frequency of A^+, O^+, B^+ and AB^+ was 40.8%, 28.9%, 14.5% and 9.2%, respectively. Also, the frequency of A^-, B^-, AB^-, O^- with each other was 6.5%. In control group, A^+, O^+, B^+ and AB^+ was 27.2%, 34.6%, 21% and 8.6%, respectively. Also, the frequency of A^-, B^-, AB^-, O^- with each other was 8.6%. There was no significant correlation statistically between of two groups with blood groups (P=0.58).

Table 1. The frequency of blood groups in cases and controls

Blood Group, n(%)	Case	Control	Total	P-value
A^+	31(40.8)	22(27.2)	53(33.8)	
A^-	2(2.6)	1(1.2)	3(1.9)	
B^+	11(14.5)	17(21)	28(17.8)	
B^-	1(1.3)	2(2.5)	3(1.9)	
AB^+	7(9.2)	7(8.6)	14(8.9)	
AB^-	0(0)	0(0)	0(0)	
O^+	22(28.9)	28(34.6)	50(31.8)	
O^-	2(2.6)	4(4.9)	6(3.8)	
Total	76	81	157	0.58*

*Chi square Test

The Table 2 shows the frequency of BMI in cases (before any treatment) and controls. We divided both groups to 5 BMI's groups (Normal weight (18.5-24.9), overweight (25-29.9), class I obese (30-34.9), class II obese (35-39.9) and class III obese (≥40)) [6]. The frequency of BMI in two groups (case and control) was almost similar. There was no significant correlation statistically between of two groups with BMI (P=0.27).

Table 2. The frequency of BMI in cases (before any treatment) and controls

BMI, n(%)	**Case**	**Control**	**P-value**
18.5-24.9	21(27.6)	30(37.1)	
25-29.9	37(48.7)	33(40.7)	
30-34.9	14(18.4)	14(17.3)	
35-39.9	4(5.3)	3(3.7)	
≥40	0(0)	1(1.2)	
Mean±SD	27.5±4.1	26.7±4.5	0.27*

BMI: Body Mass Index *Chi square Test

The frequency of BMI in patients (before any treatment and after or at the time of chemotherapy) has been shown in Table 3. There was a significant difference between them (P=0.002). Therefore, we can say that BMI for patients after or at the time of chemotherapy decrease.

Table 3. The frequency of BMI in patients (before any treatment and after or at the time of chemotherapy)

BMI, n(%)	**Before**	**After**	**P-value**
18.5-24.9	21(27.6)	28(36.9)	
25-29.9	37(48.7)	37(48.7)	
30-34.9	14(18.4)	10(13.1)	
35-39.9	4(5.3)	1(1.3)	
≥40	0(0)	0(0)	
Mean±SD	27.5±4.1	26.3±3.6	0.002*

*Paired T-test

The Table 4 shows correlation of hypertension and age at the first menarche in cases and controls. Of 76 patients, 13.2% had hypertension and also of 81 controls, 16% had hypertension. The mean age t the first menarche for cases was 13.75 years and for controls was 13.77 years. There was no correlation of between of these variables with BC incidence (P>0.05).

Table 4. Correlation of other variables in cases (before any treatment) and controls

Variable	Case	Control	P-value
Hypertension, n(%)			
Yes	10(13.2)	13(16)	0.38*
No	66(86.8)	68(84)	
Mean age at the first menarche (year)	13.75	13.77	0.93**

* Chi square Test ** T-test

4. Discussion

BC is the most common cancer (27% of all cancers) [7], and in Asia the maximum incidence is in 40 – 50 age groups. In Contrast, in western countries the increase in incidence continues as the age increases [8].

A study in 549 women including 173 cases and 376 controls concluded that there is no significant association between blood types ABO (Rh) and the BC ($P > 0.05$) [9]. Stamatakos *et al.* [10] showed that a positive family history is more commonly found in Rh (+) patients irrelevantly of blood groups ABO. Rh^+ women with positive family history are more often presented in blood group A and less often in blood groups AB and B. Ductal type occurs more frequently in Rh^+ patients regardless of the blood group ABO. Other study [11] retrospectively evaluated files of 335 patients with BC who were treated between 2005 and 2010. Some 63.0% were A, 17.6% O, 14.3% B and 5.1% AB. In addition, 82.0% of the cases were Rh-positive. Gates et al. [12] suggested there was no association between ABO blood group and BC incidence or survival. In this study, the frequency of A^+, O^+, B^+ and AB^+ in the patients was 40.8%, 28.9%, 14.5% and 9.2%, respectively. Also, Rh^+ was 6.5% for BC patients and there was no association between ABO blood group and BC incidence.

The most important predictors of BC in the Eastern Mediterranean Region (EMR) were history of no live birth, BMI more than 30, age at first pregnancy more than 30 years old, physical inactivity and smoking. Almost all these risk factors are consistent with known risk factors for this cancer in other parts of the world [2]. Lower BMI showed decreased BC risk in both pre and postmenopausal women [13]. Several studies have generated support for Haenszel's hypothesis, with the confirmed association between obesity and poorer BC prognosis [14,15,16]. In this study, there was no association between BMI and BC incidence, but in the patients after or at the time of chemotherapy, BMI reduces significantly (P<0.005) that probably weight loss is side effect of chemotherapy drugs or stress in the patients.

An analysis, which included 492 cases (breast cancer) and 768 controls, reported that mean age at menarche for controls was 13 year and for cases was 12.9 years and there was no a statistically significant between of BC accidence and mean age at menarche (P>0.05) [17]. Orgéas et al. [18] showed that age at menarche has a significant impact on BC prognosis and survival. In our study, mean age at menarche for cases was 13.75 years and for controls was 13.7 years and there was no significant correlation between of age at menarche with BC incidence(P>0.050).

Peeters et al. [19] with surveying of 523 breast cancer patients concluded that the results do not support an association between hypertension and breast cancer, but Pereira et al. [20] showed that a significant association

was found between hypertension and BC over the entire sample and when restricted to postmenopausal women. Hypertension is highly prevalent in Latin America and may be a modifiable risk factor for breast cancer; therefore, a small association between hypertension and BC may have broad implications. A few previous studies have proclaimed a link with hypertension and BC [21,22,23], whereas newer studies failed to find any association [19,24,25] In this study, there was no correlation between of hypertension and BC (P>0.05).

5. Conclusions

Blood groups, BMI, age at the first menarche and hypertension are not singly risk factors for BC incidence, but probably combination of them can increases BC incidence. In our opinion, the link between of BC and listed variables is unexplained.

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