

Study of the association between blood types and breast cancer among Isfahanian women with breast cancer

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Abstract

Background: Previous studies suggest a possible association between ABO blood group and the risk of breast cancer. The aim of this study is to investigate the presence of a possible association between breast cancer and blood groups ABO and Rh.

Materials and Methods: 549 women including 173 cases and 376 controls were selected. The case group included patients with breast cancer and the cancer diagnosis was confirmed for all of them. The control group included women with no reports of breast cancer. Blood group sampling of all cases was performed. The obtained information regarding presence or absence of cancer, blood type, age group and type of cancer were analyzed.

Results: There is no significant association between blood types ABO (Rh) and the breast cancer. ($P > 0.05$) It has been found that the prevalence of invasive intraductal carcinoma was 85% among the cases. About 5% of the total diagnosed cancers in the case group were allocated to modularly carcinoma, invasive lobular carcinoma and Paget's disease. There was no relative frequency in specific blood group for these three types of cancer. The blood types ABO (Rh) and breast cancer type showed no significant relation ($P = 0.2$).

Conclusion: According to the obtained results from this study, there was no relative frequency in specific blood group for these three types of cancer and the blood type could not be influenced as a risk factor in breast cancer.

Key Words: Blood group, breast cancer, risk factor

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INTRODUCTION

Breast cancer is a major public health problem for women throughout the world.^[1-4]

Previous studies suggest a possible association between ABO blood group and the risk of some epithelial malignancies, including gastric cancer and pancreatic cancer.^[5-6] Several plausible mechanisms, including inflammation, immune-surveillance for malignant cells, intercellular adhesion, and membrane signaling have been proposed to explain the observed association between ABO blood groups and cancer risk.^[7]

During the past years, studies have conducted to show the association between breast cancer and the blood types. However, the results were different and there are many controversy therefore the aim of this study

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is to investigate the presence of a possible association between breast cancer and blood groups ABO and Rh.

MATERIALS AND METHODS

Study design

This research is designed and conducted based on a case-control study. The studying population was divided into two groups. The case group included patients with breast cancer and the cancer diagnosis was confirmed for all of them. The control group included women with no reports of breast cancer in their medical records and with no history regarding breast tumors. Our attempt was to choose the controls in which they can be the representatives of the population from which the patients were drawn.

Study population

Affected women with breast cancer, who went to three general hospitals including Seyyed-al-Shohada hospital, Sina hospital and Dr.Shariati hospital, have constituted the case group. These hospitals are located in the city of Isfahan.

One hundred seven cases entered the study within their radiotherapy procedures. After breast surgery in different hospitals around the city, malignancy was confirmed by histopathological analysis in these 107 patients, therefore they were referred to Seyyed-al-Shohada hospital for radiotherapy. Blood samples of cases have been collected at the radiotherapy department of Seyyed-al-Shohada hospital after the radiotherapy procedure in outpatient status.

Sampling was done by the aid of lancet and in sterile conditions. Thus, three drops of blood were taken from the patients and their blood types were determined by the aid of the relevant ABO/Rh Blood Typing Kit.

66 patients entered the case population when they were taken to Some general hospitals in Isfahan for breast surgery to remove the breast tumor or tumor biopsy. They entered the case population after the pathology confirmed the malignancy of their tumors.

Their blood groups were also recorded. Since in breast cancer surgeries, blood group is not normally requested, hence the blood groups of these patients were determined after the operation and by their leaving the hospital and by the aid of the relevant ABO/Rh Blood Typing Kit.

Blood group sampling of all cases was performed in the mentioned hospitals during the 4th quarter of

2009. The control group was also evaluated in the same period of time included Isfahanian women who donated blood at one of Isfahan Blood Transfusion Organization branches.

Written approval letter were taken from the patients, so that the relevant information could be used for the study.

We put all of our efforts to select cases and controls from people with the same socio-economical backgrounds and from. All women in this study were living in the city of Esfahan. The majority of patients who were referred to the above-mentioned hospitals are from Esfahanian middle-class society (frequently from Esfahanian worker's society).

According to Isfahan Blood Transfusion Organization administration; the majority of women who used to donate blood in Esfahanian society are from middle class families with same social, economical and even religious backgrounds.

The control group was chosen among a number of Isfahanian women who donated blood at one of Isfahan Blood Transfusion Organization branches during the 4th quarter of 2009. These women had no records of breast problems (asked by blood collectors who accepted to cooperate with us). These women matched by case group in age and blood groups by research supervisor.

The condition to enter the research was having the age of at least 25 years.

549 women including 173 cases and 376 controls were divided into 4 age categories of 25-35, 36-45, 46-55 and over 56, independently.

Other information regarding the control group was received by the computer center of Isfahan blood transfusions center.

Data analysis

The obtained information regarding presence or absence of cancer, blood type, age group and type of cancer were submitted to the SPSS.18 program. The difference between the average amounts of comparing groups analyzed by Chi-square and *t*-test method. *P* value less than 0.05 should be considered as significant.

RESULTS

The obtained results of the frequency of blood type for both case and control groups are shown in Table 1. As

can be seen in this table, the distribution of blood types are very much similar in both case and control groups, such that blood type O+ had the most frequency, That was followed by blood groups A+, B+, O-, AB+, A-, B-, AB-, respectively. Statistical analysis of the above results was acceptable. There are no significant relations between blood types ABO (Rh) and the outbreak of cancer (P value = 0.6).

The obtained results from the frequency of blood types, as distinct with the types of breast cancer in this research, are shown in Table 2. According to this table, it has been found that the prevalence of invasive intraductal carcinoma was 85% among the cases. It was seen that among cases who affected by this type of cancer, The distribution of blood types was according to the previous trend, such that O+ had the most frequency, followed by A+ and B+ with a little difference from each other. About 5% of the total diagnosed cancers in the case group were allocated to modularly carcinoma, invasive lobular carcinoma and Paget's disease. There was no relative frequency in specific blood group for these three types of cancer. There are no significant relation between blood types ABO (Rh) and breast cancer type (P value = 0.2).

Table 3 shows the distribution of healthy people and ill persons in four different age groups. According to this table 46% of the case group is placed in the age group of 46-55 years. The statistical test on the table results showed a significant relation between the age groups and outbreak of breast cancer (P value = 0.04). This case confirms the age factor in outbreak of cancer and on the other hand, confirms the conditions of this research, from the view point of number of samples and the design for finding a risk factor in breast cancer disease.

DISCUSSION

The role of genetic factors in the development of malignancy is widely accepted. During the last decades, the role of inheritance in breast tumorigenesis has been clearly established.

Alevizos *et al.*^[8] showed a further association between blood group A and pernicious anemia.

Khalili *et al.* showed that during 996,779 person-years of follow-up, we documented 1,025 incident cases of colorectal cancers. Compared to individuals with blood group O, the multivariate-adjusted HR were 1.08 (95% CI, 0.94-1.24) for blood group A, 1.20 (95% CI, 1.00-1.45) for blood group B, and 1.08 (95% CI, 0.85-1.36) for blood group AB.^[9]

Table 1: The frequency of blood groups in cases, controls and total population

Blood group	Case (%)	Control (%)	Total (%)	P value
A+	50 (28.9)	105 (27.92)	155 (23.28)	0.41
B+	41 (23.70)	83 (22.07)	124 (22.58)	0.45
O+	68 (39.30)	131 (34.84)	199 (36.24)	0.2
AB+	9 (5.20)	16 (4.25)	25 (4.55)	0.22
A-	0 (0)	14 (3.72)	14 (2.55)	0.1
B-	0 (0)	4 (0.72)	4 (0.72)	0.3
O-	5 (2.90)	22 (5.85)	27 (4.91)	0.09
AB-	0 (0)	1 (0.18)	1 (0.18)	0.9
Total	173	376	549	0.6

Table 2: The relation between blood groups frequencies and different types of breast cancer

Type of BC Blood group	IDC (%)	MC (%)	ILC (%)	Paget's Dis (%)	Total (%)	P value
A+	44 (25.42)	2 (1.15)	4 (2.31)	0(0)	50 (28.9)	0.09
B+	36 (20.8)	3 (1.73)	2 (1.15)	0 (0)	41 (23.7)	0.07
O+	58 (33.5)	5 (2.90)	4 (2.31)	1 (0.57)	68 (39.30)	0.6
AB+	7 (4.04)	0 (0)	2 (1.15)	0 (0)	9 (5.02)	0.5
A-	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1
B-	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1
O-	2 (1.15)	1 (0.57)	2 (1.15)	0 (0)	5 (2.90)	0.9
AB-	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1
Total	147	11	14	1	173	0.2

Table 3: The age ranges of cases, controls and total population

Age	Case (%)	Control (%)	Total (%)
25-35	15 (8.67)	117 (31.11)	132 (24.04)
45-56	49 (28.32)	140 (37.29)	189 (34.42)
46-55	80 (46.24)	89 (23.67)	169 (30.87)
>56	29 (16.76)	30 (7.97)	59 (10.74)
Total	173 (31.50)	376 (68.48)	549 (100)

P value=0.04

Stamatakis *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. In Rh (+) patients, ductal breast cancer is differentially distributed and is commonly observed in patients with blood group A.

Easton *et al.*^[11] shown that women with a blood group are generally prone to develop neoplasms with poor prognosis and aggressive biological behavior and that these women represent a significant percentage among breast cancer patients, higher than the actual percentage of A blood group among the general feminine population.

Gates *et al.* examined the association between serologic blood type and incident breast cancer among 67,697 women, including 3,107 cases. They showed no significant association was noted between blood type and overall or breast cancer-specific mortality. Our results suggest no association between ABO blood group and breast cancer risk or survival.^[12]

Teresa *et al.*^[13] showed Lewis and Secretor genotyping could be useful to predict respectively breast cancer susceptibility and axillary lymph nodes metastasis.

Ronco *et al.*^[14] showed regarding the implications of an inherited factor like Rh and its associations with the family history of breast cancer, it might increase the probability to generate high-risk individuals if further studies confirm the present preliminary findings.

CONCLUSION

Based on these studies there is a controversy in the role of ABO/Rh blood groups in breast cancer. According to the obtained results from this study and the other like Gates *et al.*^[12] study, there was no relative frequency in specific blood group for these three types of cancer and the blood type could not be influenced as a risk factor in outbreak of breast cancer or outbreak of a specific type of cancer. ABO/Rh blood group couldn't be used as a prognostic factor in breast malignancy patients. However, further studies with larger number of patients are needed to exactly establish the role of ABO/Rh blood groups as a prognostic factor in breast cancer patients.

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