Study of association between blood group type and breast cancer among women with breast cancer

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IN
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Surgery specialist
بسم الله الرحمن الرحيم

وَقَلْ رَبِّي زَدْنِي عَلْماً
صَدِقَ اللَّهُ الْعَلِيُّ الْعَظِيمُ
Dedications

To our families, friends, teachers and all those who helped us finishing our study.
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introduction

A high number of breast cancer cases are diagnosed every year. Family history of breast cancer, age of menarche, duration of lactation, parity, age of menopause, diet and hormonal levels are known risk factors for the development of breast cancer. One of the major antigens in humans is the blood group antigens that are present on the surface of red blood cells and different epithelial cells and alteration of these blood group antigens is associated with cancer. An
association between the ABO blood group and cancer risk was reported in an old previous study, where blood group A was associated with increased risk of **stomach cancer**. Other recent studies have reported the association between blood groups O and A individuals with increased incidence of duodenal ulcers and gastric carcinoma as well as, the association of B group type and **pancreatic cancer**, Hodgkin’s lymphomas and **cardiac cancer**. Therefore, blood group antigens on the surface of cancer cells can be used
as useful prognostic and diagnostic markers in different types of human cancers. Blood group A is associated with increased risk of various tumors, including neurologic tumors, salivary gland, colon, uterus, ovary, pancreas, kidney, bladder and cervix. O blood group is also involved in skin cancer and melanoma. The ABO gene on chromosome 9q34 encodes glycosyltransferases that catalyze the transfer of nucleotide donor sugars to the H antigen to form the ABO blood group antigens.
Numerous reports have documented a relation between blood types and breast cancer incidence and prognosis. However other studies have not found any relation between susceptibility to cancer breast. The association between blood group antigen expression and prognostic factors among breast cancer patients has been suggested by previous studies. The A antigen was associated with increased risk of developing invasive ductal carcinoma in Greek women. However, the evidence of an association
between blood type and breast cancer is inconsistent as some studies found no association between blood group and breast cancer risk. So our aim is to evaluate the possible relationships between blood groups and risk of breast cancer.

MATERIALS AND METHODS

Study design

This research is designed and conducted based on an analytical study. The breast
cancer diagnosis was confirmed for all of them.

**Study population**

Affected women with breast cancer, who went to two general hospitals including Al-Habobi teaching hospital and Al-Hussien teaching hospital as well as surgeon private clinic, have constituted the cases involved in study. These hospitals are located in the city of Thi-qar. One hundred case entered the study within their radiotherapy procedures. After breast surgery in different hospitals around the city, malignancy was confirmed by histopathological analysis in these 100 patients, therefore they were referred to Al-Habobi hospital for radiotherapy. Blood samples of cases have been collected at the radiotherapy department of Al-Habobi 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.

Some patients entered the case population when they were taken to Some general hospitals in Thi-qar 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.

Blood group sampling of all cases was performed in the mentioned hospitals during the 1st quarter of 2017.

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 from people with the same socio-economical backgrounds and from. All women in this study were living in the city of Thi-qar. The majority of patients who were referred to the above-mentioned hospitals are from Thi-qarian middle-class
society (frequently from Thi-qarian worker's society).

99 cases were divided into 4 age categories of 25-35, 36-45, 46-55 and over 56, independently.

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 case groups are shown in table 1. As can be seen in this table, the distribution of blood types reveal that blood type O+ had the most frequency. That was followed by blood groups B,A and AB, respectively.

<table>
<thead>
<tr>
<th>BG</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood group A</td>
<td>22</td>
<td>22.2</td>
<td>22.2</td>
<td>22.2</td>
</tr>
<tr>
<td>Blood group B</td>
<td>29</td>
<td>29.3</td>
<td>29.3</td>
<td>51.5</td>
</tr>
<tr>
<td>Blood group O</td>
<td>33</td>
<td>33.3</td>
<td>33.3</td>
<td>84.8</td>
</tr>
<tr>
<td>Blood group AB</td>
<td>15</td>
<td>15.2</td>
<td>15.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The frequency of blood groups in cases.
Table 2 shows the distribution of ill persons in four different age groups. According to this table 39.4% of the case group is placed in the age group of 36-45 years. 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.

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>25-35</td>
<td>15</td>
<td>15.2</td>
<td>15.2</td>
</tr>
<tr>
<td></td>
<td>36-45</td>
<td>39</td>
<td>39.4</td>
<td>54.5</td>
</tr>
<tr>
<td></td>
<td>46-55</td>
<td>25</td>
<td>25.3</td>
<td>79.8</td>
</tr>
<tr>
<td></td>
<td>56-80</td>
<td>20</td>
<td>20.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
The table 3 below shows that patients with Blood group B is more frequent in age group 25-35 in a percent of 40%, patients with blood group O is more frequent in age
group 36-45 in a percent of 38.5%, patients with blood group B and blood group O are equally distributed in age group 46-55 in a percent of 36%, in age group 56 and above blood group B being the most frequent in a percent of 50%.

The test of significance of the table below determine a P value of 0.154 which indicate that there is no significant association between blood group type and breast cancer.

<table>
<thead>
<tr>
<th>age</th>
<th>Count</th>
<th>Blood group A</th>
<th>Blood group B</th>
<th>Blood group O</th>
<th>Blood group AB</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-35</td>
<td></td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>% within age</td>
<td>20.0%</td>
<td>40.0%</td>
<td>26.7%</td>
<td>13.3%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>3.0%</td>
<td>6.1%</td>
<td>4.0%</td>
<td>2.0%</td>
<td>15.2%</td>
</tr>
<tr>
<td>36-55</td>
<td></td>
<td>12</td>
<td>4</td>
<td>15</td>
<td>8</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>% within age</td>
<td>30.8%</td>
<td>10.3%</td>
<td>38.5%</td>
<td>20.5%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>12.1%</td>
<td>4.0%</td>
<td>15.2%</td>
<td>8.1%</td>
<td>39.4%</td>
</tr>
<tr>
<td>46-55</td>
<td></td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>% within age</td>
<td>16.0%</td>
<td>36.0%</td>
<td>36.0%</td>
<td>12.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>4.0%</td>
<td>9.1%</td>
<td>9.1%</td>
<td>3.0%</td>
<td>25.3%</td>
</tr>
<tr>
<td>56 and above</td>
<td></td>
<td>3</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>% within age</td>
<td>15.0%</td>
<td>50.0%</td>
<td>25.0%</td>
<td>10.0%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td>3.0%</td>
<td>10.1%</td>
<td>5.1%</td>
<td>2.0%</td>
<td>20.2%</td>
<td></td>
</tr>
<tr>
<td>Total Count</td>
<td>22</td>
<td>29</td>
<td>33</td>
<td>15</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>% within age</td>
<td>22.2%</td>
<td>29.3%</td>
<td>33.3%</td>
<td>15.2%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td>22.2%</td>
<td>29.3%</td>
<td>33.3%</td>
<td>15.2%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

### Chi-Square Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
<th>Point Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>13.208</td>
<td>9</td>
<td>.153</td>
<td>.154</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>13.526</td>
<td></td>
<td>.126</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.077b</td>
<td>1</td>
<td>.781</td>
<td>.799</td>
<td>.411</td>
<td>.039</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is 2.27.
b. The standardized statistic is -.278b.

### CONCLUSION

Based on these studies there is a controversies 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. study, there was no relative frequency in specific blood group for breast 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.

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. 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.

Stamatakos et al. showed that a positive family history is more commonly found in Rh (+) patients irrelevently 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. 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.

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

Ronco et al. 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.

ACKNOWLEDGMENT

Numerous people have helped and supported us in our endeavors. Most especially, we wish to express our deepest gratitude, Special thanks, and appreciation to our supervisor Dr. Abdul Al-Hussien Al-Jaber for his guidance, Assistance, time, encouragement throughout the study,
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Finally, my enduring gratitude goes to my family for their unfailing encouragement, patience, and love.
REFERENCES


