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Association of ABO Blood Group with Breast Cancer: An Observational Study

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Abstract

Introduction: The present study was conducted to analyse the relation of ABO blood groups with breast carcinoma.

Materials and Method: The study was conducted on 100 clinically diagnosed breast cancer patients. The standard agglutination test was used to determine the blood groups. Association of ABO blood groups and risk of breast cancers was found out with Odd Ratios (ORs) with 95% Confidence Interval (CI).

Results: Breast cancer was found minimum in blood group 'AB' and maximum in blood group 'A'. It may be due to influence of blood group antigens on systemic inflammatory response which has been associated with the malignancies. The ABO antigen expressed on the surface of malignant cells appears to be different from the antigen expressed on normal tissue.

Conclusions: High frequency of breast cancer was found in blood group A followed by B and O strong relationship between blood group and breast cancer. The different expression of antigens on the surface of cancer cells might alter motility, apoptosis and immune escape. These mechanisms might influence the initiation and spread of malignancies.

Keywords: *ABO blood group, Breast cancer.*

Introduction

About one million new cases of breast cancer are diagnosed every year. [1] In some tumors, alteration of ABO/Lewis-related antigens is associated with malignant transformation.[2] Blood group carbohydrate antigens on the surface of cancer cells can be regarded as an end product of tumor progression that can be used as useful prognostic and diagnostic markers. [3] ABO blood group genes are mapped at 9q34.2 region in which genetic alteration is common in many cancers. The loss or presence of blood group antigens can increase cellular motility or facilitate the interaction between tumor cells and endothelial cells of distant organs. [4] In many cancers, the deficiency of A or B epitope has been reported which is associated with accumulation of their precursor, which causes enhanced malignancy.

Material and Method: This observational study was conducted in the Department of Physiology, Surgery and Obstetrics & Gynaecology of Katihar Medical College, Katihar for a period of 12 months from May 2017 to April 2018.

A total of 100 newly and confirmed diagnosed breast cancer patients were taken for this study as cases. A written informed consent was obtained from all subjects before their participation. The data of age, sex, ABO blood group and pathological status of cancer were collected from the outdoor department.

Inclusion criteria:

1. Female patients of any age group.
2. Pathologically confirmed diagnosis of breast cancer attending OPD.

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Exclusion criteria:

1. Familial cancer history,
2. Patients on oral contraceptive pills,
3. Patients having menopause.

History taking, detailed physical examinations performed, routine radiological and laboratory investigations including complete blood count (CBC), tumor markers for breast cancer was done.

Blood samples were obtained into vacuum glass tubes containing EDTA. ABO blood typing was carried out with standard agglutination method. ABO blood groups were determined by using antiserum A and Antiserum B. [5]

Standard Agglutination Method: In agglutination test firstly, we prepare red cell suspension in a test tube and then in under aseptic precautions add a drop of blood. Then a drop of each antiserum (antiserum A, antiserum B) on is placed on glass slide with the help of dropper and a drop of isotonic saline (used as control) also placed on the slide. The slide is accordingly labelled as anti-A, anti-B and control. After 10 minutes, examined for the presence of agglutination (clumping of RBC) under low power microscope, if there is no agglutination (RBC remain separated and evenly distributed), and if agglutination occurs the RBC are massed together in clumps.

Statistical analysis: For each factor, we calculated the adjusted Odds Ratios (OR) and 95% confidence Interval (CI) using maximum likelihood estimation.

Results

Table I: Association of risk of breast cancer in relation to ABO blood group

Blood Group A		Blood Group B		Blood Group O		Blood Group AB	
No. of cases	OR's with 95% CI	No. of cases	OR's with 95% CI	No. of cases	OR's with 95% CI	No. of cases	OR's with 95% CI
n= 37	8.54	n=33	7.28	n=23	4.88	n=7	2
(0.476-2.103)		(4.098-13.522)		(3.365-11.195)		(2.087-7.169)	

In this study we found that there was an association exists between blood groups A with breast cancer in sample population. Above table described a total of 100 breast cancer cases. Maximum cancer cases were found in blood group A.

Discussion

Blood group A person, who cannot make anti-A antibodies will be more likely to tolerate cancer, and blood group A person's immune system will less likely to attack the body's own tissues.[6]

A study of rapidly progressive breast cancer in Tunisian women found a slightly increased risk of a positive diagnosis in blood type A was reported by Mourali. [7] There are also some contradictory reports available about the association of blood group with breast cancer.

Jayant K [8] reported no relation among breast cancer to blood groups whereas Surekha et al [9] have reported a high incidence exist between breast cancer and blood group B individuals. In the last 25 years, there has been a tremendous amount of work published on the chemistry of blood group antigens and tumor immunology.

As cells (e. g. in tissue) become malignant, they tend to lose normal antigens and acquire new antigens; these are so called tumor antigens. It has been proven that ABO antigens diminish on malignant cells as the malignancy progresses the loss of A, B and H antigen is proportional to the metastatic potential of the tumors.[8, 10] The reason that deletion or reduction of the A or AB antigens in tumors of A or B individuals correlate with malignancy a metastatic potential may be due to lack of adhesiveness that a cancer cell achieves when its losses blood group antigens. The loss of blood antigen results in the tumor cells gaining the ability to move and circulate through the body, because blood type antigens loss the ability to express many cell adhesion proteins, such as integrins, which normally express an A like antigen on their receptor and control cell movement. [11]

Blood group A cancer patients had the greatest and most uniform suppression of the level of Tn antigens, irrespective of age, cancer stage, or tumor morphology and lower level of anti-B isohemagglutinnins. This is probably at least a part of the explanation for the poorer outcomes in many cancers among blood group A individuals. [12]

Hakomori suggested that if the immune surveillance theory is correct and we recognize tumor antigens as foreign, leading to attack of the tumor, then the "A-like" properties of tumor antigens may not be recognized by group A patients. [13]

Tumor Immune Surveillance in the immune system can specifically identify and eliminate tumor cells on the basis of their expression of tumor specific antigens or molecules induced by cellular stress whereby immune system identifies the cancerous or precancerous cells and eliminates them before they can cause harm. [14] It would be interesting to know that the percentage of patients in this particular study were of Blood Group "A". [15] It appears that a more integrated treatment protocol should be considered using conventional modalities as well as dietary modifications.

Blood Group "A" individuals have a very low immunologic response to T and Tn antigens because they share the same sugar (N-acetygalactosamine). This allows the cancer cells to bypass the immune system and replicate with little interference from the type A antibodies will have an effect on cancer survivorship. [15]

Conclusion

Some studies on blood groups showed positive association and others were negative. It appears that different blood groups are associated with breast cancer; Blood group A apparently increases the risk for cancer. This study concludes that, in case of breast cancer, high frequency of breast cancer was found in blood group A followed by B and O strong relationship between blood group and breast cancer.

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