



## A Study of Association of ABO Blood Group With Breast Cancer

### KEYWORDS

Breast cancer, ABO, malignancy, tumour marker

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**ABSTRACT** - Cancer is the second most common cause of death in the Western world, first being cardiovascular disease. Breast cancer has become the most common type of cancer in Indian women and accounts for about 20 – 25 % of all female cancers in India. Over one million new cases of breast cancer are diagnosed every year. There are several evidence suggesting role of ABO blood group in disease etiology. Previous studies suggest a possible association between ABO blood group and the risk of breast cancer.

**Objective :** The aim of this study is to found any association between breast cancer and ABO blood group and also to know the frequency of each blood group in case of breast cancer.

**Materials And Methods :** The study was done in JLNMCH, Bhagalpur and private clinics of Bhagalpur including 110 patients who were diagnosed having breast cancer from January 2010 to December 2015 and 200 controls who were not having breast cancer. Blood group of all patients and controls were done by standard agglutination test.

**Results:** This study shows an association between ABO blood group and risk of breast cancer. A significant difference in distribution of blood group in patients of breast cancer and that of control were found. Among patients of breast cancer the distribution of blood groups were as follow-blood group "A" 60% (66), blood group "O"- 20.9% (23), blood group "B"- 10.9% (12), and blood group "AB"- 8.2% (09) while in control group the distribution of blood group were like – blood group "A"- 22.7% (25), blood group "B"- 39.1% (43), blood group "O"- 29.1% (32) and blood group "AB"- 9.1%(10). In this study breast cancer was found maximum in blood group "A" and minimum in blood group "AB".

### INTRODUCTION

Cancer is a disease on which lot of work has been done in comparison to other diseases. Breast cancer has become a major health problem for women throughout the world. Over one million new cases of breast cancer are diagnosed every year. Many risk factors are associated with the development of breast cancer, it is seldom mentioned that blood group has an influence on susceptibility and outcomes. Some researchers say that " blood group were shown to possess a predictive value independent of other known prognostic factors for breast cancer". ABO blood group has been associated with risk and survival of several malignancies. Several research were done showing association between ABO blood group and different type of cancers like high incidence of blood group "A" in various cancers such as gastric cancer, neurological tumors, tumors of salivary gland, colon, uterus, ovary, pancreas, kidney, bladder and cervix and high incidence of blood group "O" in skin cancer and melanoma. It may be due to the effect of blood group antigens on systemic inflammatory response, which has been associated with the malignancies. The ABO antigen expression on the surface of malignant cells are different from that on the normal cells. This difference in expression of antigens on the surface of cancer cells may affect the inflammation, immune-surveillance for malignant cells, intercellular adhesion and membrane signaling. The blood group carbohydrates expressed on cell surface of metastatic cancer cells in some type of malignancy, function as cell adhesion molecules. The loss or presence of blood group antigens can increase cellular motility or facilitate the interaction between tumor cells and endothelial cells.

In some tumors alteration of ABO/Lewis-related antigens is

associated with malignant transformation.

According to Garratty G. several 'tumor antigens' or 'tumor markers' are the known product of certain blood type precursors. Many of these tumor antigens are 'A-like' which helps in part to explain the striking number of associations with blood group " A" and "AB". On the contrary, autoimmune disorders tend to be associated with blood group " O".

Some researchers have suggested that a degree of susceptibility to breast cancer from a gene prospective, might be a result of a breast cancer susceptibility locus linked to the ABO locus located on band q34 of chromosome 9.

The purpose of this study is to found whether there is any association between breast cancer and ABO blood group and if it is there, then what is the frequency of each blood group in relation to breast cancer patients.

### Material And Method

This study was conducted in JLNMCH, Bhagalpur and private clinics of Bhagalpur. 110 patients were included in the study group, who were diagnosed having breast cancer from January 2010 to December 2015 and 200 controls – women who had no history of breast tumors or had no report of breast cancer in their medical records were included.

Blood sample of all patients having breast cancer and control were taken and collected in EDTA vial. Blood group of all of them were done by standard agglutination test using antiserum A and antiserum B.

## Results

The result of this study shows an association between blood group and breast cancer. Out of 110 patients, 60% (66) were of blood group "A", 20.9%(23) were of blood group "O", 10.9%(12) were of blood group "B" and 8.2%(09) were of blood group "AB". A significant difference was observed when it was compared with distribution of blood group in control. Distribution of blood group in control was like blood group "A" 22.7% (25), blood group "B" 39.1% (43), blood group "O" 29.1%(32) and blood group "AB" 9.1%(10).

### Distribution of blood group among patients with breast cancer

Blood group	Frequency	Percentage
A	66	60%
O	23	20.9%
B	12	10.9%
AB	09	8.2%

### Distribution of blood group among control

Blood group	Frequency	Percentage
A	25	22.7%
O	32	29.1%
B	43	39.1%
AB	10	9.1%

## Discussion

The result of this study showed that there is highest association of blood group "A" and least association of blood group "AB" to breast cancer. Whereas blood group "B" was found to be most common in controls. The result of this study was favored by several previous studies showing significant association of blood group "A" with breast cancer.

Guleria after his study showed that group "A" was significantly associated with breast cancer when compared to control. This result was supported by several other studies worldwide. But there are also some contradictory reports available about the association of blood group with breast cancer. Jayant K reported no relation among breast cancer to blood groups, whereas Surekha et al have reported a high incidence between breast cancer and blood group "B" individuals.

An increased surveillance and overactive immune activity reduces risk of malignancy, whereas overly tolerant immune activity tends to encourage it. In the tissue of both normal and cancerous people, there are A-like antigens that are usually inaccessible to the immune system. However, when stimulated by an autoimmune process or the immune response to a growing cancer, the antigen becomes accessible. Now the blood group "A" person, who cannot make anti-A-antibodies will be more likely to tolerate cancer and their immune system will be less likely to attack the body's own tissues.

The blood group type is a genetic factor and it affects the risk of different cancers. Several studies on association between tumor outcome and the ABO blood groups have shown increased relative risk for some blood groups.

According to Garratty G. as cells become malignant, they tend to lose normal antigens and acquire new antigens, these are 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. Deletion or reduction of A or B antigens in A or B individuals correlate with malignancy and metastatic potential, may be due to adhesiveness that a cancer cell achieves when

it loses blood group antigens. Now these tumor cells can move and circulate through the body.

Many malignant cells develop a tumor marker called Thomsen-Friedenrich (t) antigen, which is suppressed in normal healthy cells. Tn antigen which is precursor of T antigen only becomes unsuppressed when the cell become malignant. Blood group "A" individuals have a very low immunological response to T and Tn antigens because they share the same sugar (N-acetylgalactosamine). This allows the cancers cell to bypass the immune system and replicate with little interference from the type A antibodies.

Rosen PP et al. during their study on blood groups and response to therapy for mammary cancer found that blood group "A" women have a generalized tendency to worse outcomes and a more rapid progression with this cancer. Research indicates that blood group "A" women are over-represented among breast cancer patients, and that this trend occurs even among women thought to be at low risk for cancer. The results of these studies were also supported by Anderson DE et al.

## Conclusions

Although breast cancer can appear in patients of different blood groups, but there is strong association with blood group "A". In this study highest frequency of breast cancer was found in blood group "A" and least frequency in blood group "AB". Blood group "A" is also considered to be a risk factor for development of breast cancer and can also affect the prognosis.

## References

- Anderson DE, Haas C. Blood type A and familial breast cancer. *Cancer* Nov 1984; 14(9): 1845-1849.
- Iodice S, Maisonneuve P, Botteri E, Sandri MT, Lowenfels AB, ABO blood group and cancer. *Eur J Cancer* 2010; 46: 3345-3350.
- Su M, Lu SM, Tian DP, Zhao H, Li XY, et al. Relationship between ABO blood groups and carcinoma of esophagus and cardia in Chaonian inhabitants of china. *World J Gastroenterol* 2001; 7: 657-661.
- Sambyal V ABO Blood Groups in Gastrointestinal Tract (GIT) and Breast Carcinoma Patients. *Anthropologist* 2005; 7(3): 189-192.
- Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM, Estimates of worldwide burden of cancer in 2008. *GLOBOCAN 2008. Int J Cancer* 2010; 127: 2893-2917.
- Henderson J, Seagrott V, Goldacre M. Ovarian cancer and ABO blood groups. *J Epidemiol Comm Hith* 1993; 47: 287-289.
- Karakousis CP, Evlogimenos E, sun O. Blood groups and malignant melanoma. *J Surg Oncol* 1986; 33: 24-26.
- Aird I, Bentall HH, Roberts JA, A relationship between cancer of stomach and the ABO blood groups. *Br Med J* 1953; 1: 799-801.
- Garratty G. Blood groups and disease: a historical perspective. *Transfus Med Rev* 2000; 14: 291-301.
- Hirohashi S. Tumor associated carbohydrate antigens related to blood group carbohydrates. *Gan To Kagaku Rhyoho* 1986; 13(2): 1395-1401.
- Rummel S, Shriver CD, Ellsworth RE Relationships between the ABO blood group SNP rs505922 and breast cancer phenotypes;
- Garratty G. Association of blood groups and disease: do blood group antigens and antibodies have a biological role? *Publ Stn Zool Napoli* [II] 1996; 18(3): 321-44. [III] Guleria K, Singh HP, Kaur H and
- Simoneau M, La Rue H, Aboukassim, T.O, Meyer, F, Moore, L and recurrence of superficial bladder cancer identification of four regions of prognostic interest *Oncogene* 2000; 19: 6317-6323.
- Zitzelsberger, H, Engert, D, Walch, A, Kulka, U, Aubele M, Hoffer, H, Bauchinger, M and Werner, M (2001) Chromosomal changes during development and progression of prostrate adenocarcinoma. *Br J. Cancer* 2001; 84: 202-208.
- Garratty G. Do blood groups have a biological role? *En Garratty G. ed. Immunobiology of transfusion Medicine. Newyork., Dekker 1994, 201-255.*