

## The Association and Relation of ABO Blood Group with the Breast Cancer at a Tertiary care hospital in Bikaner

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### Abstract

Cancer is common; it is the second most common cause of death in the Western worlds, Breast cancer accounts for around 20-25% of all female cancers in both India and UK world. ABO blood groups are a stable feature of a population and they differ among various socioeconomic, geographical and ethnic groups and many risk factors are associated with the development of breast cancer. It is mentioned that blood type has an influence on susceptibility and outcomes. Several 'tumor antigens' or 'tumor markers' are the known product of certain blood type precursors. The aim of this present study are to found any association between breast cancer and ABO blood group and what is the frequency of each blood group in relation to patients with breast cancer.

**Keywords:** Breast cancer, Blood group, Tumor antigens, phenotype

### Introduction

Cancer is common; it is the second most common cause of death in the Western world, after cardiovascular disease. Breast cancer accounts for around 20-25% of all female cancers in both India and UK<sup>1</sup>. There are differences between the percentages of patients with various malignant tumors in our country and those in the Western world. Cancer is a disease on which lot of work has been done in comparison to other diseases<sup>2</sup>.

The association between ABO blood group antigens and malignancy was made almost 100 years ago, yet the role of the ABO blood group in cancer risk and prognosis remains controversial<sup>3</sup>. ABO blood groups are a stable feature of a population and they differ among various socioeconomic, geographical

and ethnic groups. In Europe, highest frequency is of allele A, increasing to allele B from West to East<sup>4</sup>.

Arid and Bentall in 1953, they discovered of an association between stomach cancer and blood type A by there have been several studies on possible relationship of blood types to certain diseases<sup>5</sup>. Many risk factors are associated with the development of breast cancer, it is seldom mentioned that blood type has an influence on susceptibility and outcomes. In fact, some researchers have even gone so far as to say that "blood groups were shown to possess a predictive value independent of other known prognostic factors" when discussing breast cancer. Other researchers have actually suggested that a degree of the susceptibility

to breast cancer, from a gene perspective, might be a result of a breast cancer-susceptibility locus linked to the ABO locus located on band q34 of chromosome 9. Human malignancies such as colon, breast and prostate cancer as the blood group. The huge interest in blood type stems from the developing awareness that blood type antigens are incredibly important components in the process of cell maturation and control; for example the appearance or disappearance of blood type antigens is a hallmark of malignancy in many common cancers<sup>8,9</sup>. 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 type A and AB. On the contrary, auto-immune disorders tend to be associated with blood type O<sup>10</sup>.

The aim of this present study are to found any association between breast cancer and ABO blood group and what is the frequency of each blood group in relation to patients with breast cancer.

**Materials and methods**

The present retrospective study was done over a period of two and a half years (1 Jan 2013 to 30 June 2015) at Department of Immunohaematology and Transfusion Medicine of S. P. Medical College, Bikaner; which is a tertiary care hospital in North India with an attached Regional Cancer Treatment Centre and caters patients from Western Rajasthan, Punjab and Haryana. 210 patients with breast cancer are classified according to their blood group.

The control sample was 210 healthy donors and classified according to their ABO group and frequency of each sample estimated statistically, then compared with each other. Blood samples were obtained into vacuum glass tubes containing EDTA. ABO blood typing was carried out with standard agglutination method. ABO blood groups

carbohydrates expressed on cell surface of metastasis cancer cells<sup>6</sup>. The loss or presence of blood group antigens can increase cellular motility or facilitate the interaction between tumor cells and endothelial cells<sup>7</sup>.

were determined by using antiserum A and Antiserum B.

**Results**

The present study observed the distribution of ABO blood groups among patients with breast cancer were as follows: blood group type A (41%), blood group type O (30.5%), blood group type B (19%), and blood group type AB (9.5%) (table1) and in healthy donor is blood group type A (22.4%), blood group type O (31.4%), blood group type B (36.7%), and blood group type AB (9.5%) (table2).

The study observed are highly statistically significant (p,0.0001) distribution of ABO blood groups between patients with breast cancer and normal population (table 3).

**Table 1: The distribution of blood group among patients with breast cancer.**

Blood group	Frequency	Percentage
A	86	41
O	64	30.5
B	40	19
AB	20	9.5
	210	100

**Table 2: The distribution of blood group among Healthy Blood donors.**

Blood group	Frequency	Percentage
A	47	22.4
O	66	31.4
B	77	36.7
AB	20	9.5
	210	100

**Table 3: The distribution of blood groups between patients with breast cancer and normal population.**

Blood group	Patients with breast cancer		Normal population		P value	Hs
	Frequency	Percentage	Frequency	Percentage		
A	86	41	47	22.4	0.0001	Hs
O	64	30.5	66	31.4	0.0001	Hs
B	40	19	77	36.7	0.000 1	Hs
AB	20	9.5	20	9.5	0.000 1	Hs

### Discussion

The present study show the highly significant distribution of A, B, O & AB blood group in breast cancer patients as compare to normal population. The association of blood group A is an interesting one in view of the suggestion of earlier immunologist that the heightened surveillance and overactive immune activity tend to result in less malignancy, whereas overly tolerant immune activity tends to encourage it. These observations suggest that a more general hypothesis that in the tissues of all people, both normal and cancerous, there are A- like antigens present on the biochemical level 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. At that point, 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 be less likely to attack the body's own tissues<sup>11</sup>. A Study performed by Shikha Saxena et al<sup>12</sup> reported that blood group A have the highest association of breast cancer in women in Jodhpur in Western Rajasthan. Blood group AB had found the least association with breast cancer. Blood type B and O also has association with breast cancer but slightly less than blood type A. A study performed by Guleria<sup>13</sup> showed that group A was significantly associated with breast cancer when compared to control. In Iceland a

study in 1988 looked at the risk of bilateral breast cancer in 184 familial and 572 sporadic cases with regard to ABO typing.

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<sup>14</sup>. There are also some contradictory reports available about the association of blood group with breast cancer. Jayant K<sup>15</sup> reported no relation among breast cancer to blood groups whereas Surekha et al<sup>16</sup> 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<sup>17,18</sup>.

The reason that deletion or reduction of the A or AB antigens in tumors of A or B individuals correlate with malignancy and metastatic potential may be due to lack of adhesiveness that a cancer cell achieves when it losses blood group antigens. The loss of blood antigens result in the tumor cells gaining the ability to move and circulate through the body, because blood type antigens loss the ability to express many of cell adhesion proteins, such as integrins, which normally express an A like

antigen on their receptor and control cell movement<sup>19</sup>. Many malignant cells (such as those found in breast and stomach cancer) develop a tumor marker called Thomsen-Friedenrich (T) antigen, which is suppressed in normal healthy cells, Tn antigen (precursor of T antigen) only becomes unsuppressed as a cell become malignant. T and Tn antigens show some structural similarity to A antigen<sup>20</sup>. Blood group A individuals have the least aggressive antibody immune response against the T and Tn antigens and they are actually immunologically considered similar because of their shared terminal sugar(N-acetylgalactosamine), and so might be readily confused by immune system of blood group A individuals. 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-isoheamagglutinins. This is probably at least a part of the explanation for the poorer outcomes in many cancers among blood group A individuals<sup>21</sup>.

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<sup>22</sup>. 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<sup>23</sup>.

Because of resource constrain, the identification of genetic and environmental factors among racial and ethnic groups should offer some insights into the observed epidemiological data and advance opportunities to better understand the control and development of cancer. Collectively, we could hypothesize that

tumors have more chance to thrive and maximum found in blood group A patients than those in other blood groups.

### **Conclusion**

The evidence for association of blood groups with breast cancer is controversial, some blood groups showed positive association and others were negative. Blood type needs to be considered together with other risk factors to understand. 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. Further studies on blood groups in large series are needed to elucidate the relationship between blood group and disease. However, in comparison to trends of cancer occurrence from past few year reports, there has been a noticeable change in the pattern of cancer in this study. From this study some clues can be drawn for understanding the trends in cancer occurrence.

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