

Relationship Between Various Cancers And ABO Blood Groups – A Northern India Experience

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Abstract

Research Question: Incidence of ABO blood group in different cancers in Northern India
Objectives: To find out the incidence of ABO blood group in different cancers in Western Uttar Pradesh, so as to assess the utility of ABO blood group as a preclinical marker. **Design:** The study was conducted on 2640 histologically proven cancer patients attending the Blood Bank, Department of Pathology, JN Medical College, AMU, Aligarh during the period 2000-2007 for requisition of blood transfusion. ABO blood grouping was performed by the tube method in all the cancer patients. The age, sex, ABO blood type and pathological status of all the patients were collected. The control sample was collected from the healthy blood donors. **Results:** Among 2640 cancer patients, 1168 were males and 1472 female. When all cancers were taken together, the highest frequency of blood group B (40.5%), followed by A (34.2%), O (16.0%) and AB (9.3%) was seen. The frequency of A group was significantly higher and O group was significantly lower in cancer patients as compared to controls. A high incidence of blood group B (37.5%) followed by A (35%) was seen in oral cancers. Among gastrointestinal (GIT) cancer, a high frequency of blood group B (40%), followed by O (26.7%) was noted. The incidence of A blood group was significantly higher in breast cancer and lung cancer patients, 42.4% and 50.0% respectively. **Conclusion:** Racial and ethnic distribution of blood groups is an important factor for predicting cancer risk and the identification of genetic and environmental factors among racial and ethnic groups should offer some insights into an observed epidemiological data and opportunities to better understand the control and development of cancer.

INTRODUCTION

The ABO blood type, an easily accessible factor in patient's genetic make up, has been associated with many diseases, though the explanation for the association with ABO blood groups and some disease is still unclear.

Since the first report showing an association between blood group A and gastric cancer¹, numerous other reports have documented a relation between susceptibility to cancer and blood group. High incidence of blood group A in various cancers, including neurologic tumors, salivary gland, colon, ovary, kidney and cervix,² and consistent relation to O blood group in skin and melanoma³ have been reported.

ABO blood group genes are mapped at 9q34.2 region in which genetic alteration is common in many cancers. A correlation of blood group antigen expression in tumor with metastasis and prognosis has been reported for various human malignancies, such as colon, breast and prostate cancer as the blood group carbohydrates expressed on cell surface of metastatic cancer cells function as cell adhesion molecules⁴.

The ABO blood group distribution varies in different geographical, ethnic and socio-economic groups⁵. The blood group frequency in north India is B > O > A > AB⁶.

The present study is an attempt to correlate ABO blood group frequency with preponderance of various cancers in western Uttar Pradesh, to assess the utility of ABO blood group as a preclinical marker.

MATERIAL AND METHODS

The present study was undertaken on 2640 histologically proven cancer patients in the Blood Bank, Department of Pathology, JN Medical College, AMU, Aligarh. The data of age, sex, ABO blood type and pathological status of cancer patients, during the period 2000-2007 attending the Blood Bank with requisition for transfusion were collected. The control sample was collected from the healthy blood donors. ABO blood grouping was performed by the tube method in all the cancer patients.

RESULTS

Our study comprised 2640 cancer patients, with 1168 males

and 1472 females (M: F :: 0.79: 1). The 2640 healthy controls included 1857 males and 783 females.

When all cancers were taken together, the highest frequency of blood group B (40.5%), followed blood group A (34.2%), O (16.0%) and AB (9.3%) was seen in cancer patients. In control samples, high frequency of blood group B (40.5%), followed by O (29.5%), A (18.6%) and AB (11.4%) was noted. The frequency of A group was significantly higher and O group was significantly lower in cancer patients as compared to controls.

In assessing the different types of cancers, among oral cavity cancers, high incidence of blood group B (37.5%), followed by group A (35%), O (20%) and AB (7.5%) was seen. Amongst gastrointestinal (GIT) cancers, a high frequency of blood group B (40%), followed by group O (26.7%), group A (23.3%) and AB (10%) was reported by us. Cervical cancer patients showed a preponderance of blood group B (37.9%), followed by group A (27.6%), AB (20.7%) and O (13.8%). The incidence of A blood group was significantly higher in breast and lung cancer patients (Table I).

Figure 1

Table I: Blood group distribution in cancer patients and controls

S.No.	Type	No. of subjects	A (%)	B (%)	AB (%)	O (%)
1.	Controls	2640	490 (18.6)	1070 (40.5)	300 (11.4)	780 (29.5)
2.	Oral cavity	560	196 (35)	210 (37.5)	42 (7.5)	112 (20)
3.	Gastrointestinal tract	210	49 (23.3)	84 (40)	21 (10)	56 (26.7)
4.	Gall bladder	70	14 (20)	35 (50)	04 (5.7)	17 (24.3)
5.	Lungs	168	84 (50)	56 (33.3)	21 (12.5)	07 (4.2)
6.	Breast	462	196 (42.4)	140 (30.3)	28 (6.1)	98 (21.2)
7.	Cervix	406	112 (27.6)	154 (37.9)	84 (20.7)	56 (13.8)
8.	Ovary	294	98 (33.3)	154 (52.5)	21 (7.1)	21 (7.1)
9.	Lymphoma	84	28 (33.3)	42 (50.0)	04 (2.4)	12 (14.3)
10.	Bone	189	42 (22.2)	105 (55.6)	14 (7.4)	28 (14.8)
11.	Kidney	35	21 (60.0)	12 (34.3)	02 (5.7)	07 (20)
12.	Urinary bladder	50	28 (56.0)	20 (40)	-	02 (4.0)
13.	Central nervous system	112	35 (31.3)	63 (56.1)	07 (6.3)	07 (6.3)
Total		2640	903 (34.2)	1068 (40.5)	246 (9.3)	423 (16.0)

DISCUSSION

In cancer patients, the incidence of A group was higher in breast, lung, kidney and bladder cancers, though when all cancers were taken together, the incidence of B blood group was highest, followed by A group, whereas in controls, B and O groups were in higher frequency.

There are contradictory reports available about the

association of blood group with breast cancer. Jayant K⁷ reported no relation of breast cancer to any blood group whereas Surekha et al⁸ have reported a high incidence of breast cancer in blood group B individuals. But an increased rate of blood type A as compared to controls have been reported in breast cancer patients.⁹

A higher frequency of blood group B was seen in gastrointestinal tract and gall bladder cancers, 40% and 50% respectively in our study. Quite similarly Vioque and Walker¹⁰ have reported a strong association of gall bladder and bile duct cancers with B blood group. But Pandey et al¹¹ have shown an increased frequency of carcinoma of the gall bladder in blood group A.

Several authors have reported a high incidence of gastrointestinal cancers in blood group A patients^{11,12}. The increased risk of development of gastrointestinal cancers in patients with blood group A has been explained by the expression of Forssman antigen in these cancers, which is structurally similar to the blood group antigen A. Because of this similarity, antibodies to A probably attack precancerous and cancerous cells expressing this antigen. Since people with blood group A lack antibodies to A so they are more prone to develop these carcinomas².

Our study revealed a high incidence of lung carcinoma in blood group A patients (50%). Quite similarly Loddenkemper et al¹³ have reported a significantly higher incidence of lung cancers in A blood group patients, with a peak in young patients not older than 50 years.

A higher incidence of cancer of the cervix and ovary, 37.9% and 52.5% respectively, was seen in blood group B patients in our study; a finding similar to Kamlesh G et al⁴ who reported 57.1% of genitourinary cancers in blood group B individuals.

Though the influence of blood group types on development of brain tumors is unclear, since there are conflicting reports from surveys regarding the distribution of ABO blood groups and primary intracranial neoplasms; the present study on 112 central nervous system tumors, revealed a significantly higher association of these tumors with blood group B patients, 56.2% but Mehrazin M¹⁴ in their study on ABO blood group frequency and brain tumors found no significant differences between types of intracranial tumors and frequencies of four major blood groups.

CONCLUSION

It appears that different blood groups are associated with different manifestations of the disease. From this correlation of blood groups and various cancers, it follows that there is an inherited element in the susceptibility or protection against different types of cancers; and the racial and ethnic distribution of blood groups is an important factor for predicting the cancer risk. 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.

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