

Association of ABO Blood Group with Malignancies

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Summary :

ABO blood group of seven hundred and nine patients was documented who had been suffering from malignant neoplastic conditions of different organs and systems from Jan 97 to August 2001 at the Blood transfusion centre of CMCH. The objective was to determine any Association of ABO blood group and malignancy. It was found that, out of these 709 cases, 251 (35.40%) were A

group, 219 (30.88%) B group, 204 (28.77%) O group, 35 (4.93%) AB group. It revealed significant association of ABO blood group and malignant lesions for some of the organs and systems. Small sample size precludes firm conclusion and warrants further documentation in the community with larger sample size.

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Introduction :

A blood group system is a group of antigens encoded by alleles at a single gene locus or at gene loci so closely linked that crossing over does not occur or is very rare¹. Blood group antigens are assigned to a system after being defined immunologically, genetically and biochemically².

The ABO blood group system was the first system to be described. Antigenic differences between different species were recognized by Landois in 1985. Landstein was prompted by the work of Landois. He in 1931 first described the serologic differences between red cell of various individuals³ allowing him to classify people into one of four groups, depending on whether their red cell contained agglutinin termed A or B. The ABO blood group system is the most important one identified to date.

It has been suggested that the ABO system has evolved under a positive selection pressure. The implication is that certain ABO group provide selective vulnerability to individuals possessing a particular ABO blood group. Some blood groups are found to be associated with certain medical conditions³⁻⁶. For example blood group "O" associated with increased incidence, of Peptic ulcer and Urinary tract infection. Blood group "A" antigens are more common in person with cancer of stomach, salivary gland, colon, ovary, uterus, cervix and bladder^{5-6,7}.

In Bangladesh, about 200,000 new cases are diagnosed as cancers of different organs⁸. Identifying people at risk to take necessary preventive steps is widely accepted. Establishing association of blood group with malignancy might allow necessary steps to be taken to offer some help for these patients. This prospective study has been designed to record information regarding the association between ABO blood group and malignancy in our population to help manage these victims of malignancy.

Aims and Objectives :

1. To document ABO blood group of patients suffering from malignancies of different organs and systems.
2. To describe the association of different type of malignancies with ABO blood group.

Materials and methods :

This was a prospective observational study. ABO blood grouping of patients attending CMCH with different types of malignancies were done in the Department of Transfusion Medicine. A case record form was used for each patient with entries for Name, age, sex and diagnosis. Compiled data was tabulated and treated with statistical test to see the significance of association of blood group with malignancies.

Results :

A total of 709 patients with different types of malignancies were recorded. Blood group was done and recorded separately for individual patient. Among them 483 were male and 226 were female. Male to female ratio 2.13:1. Table-1 : show distribution of patients with different malignancies and their blood group.

Table-I*Showing Distribution of patients with cancer of different Organs according to ABO blood Groups*

Organ / System	Total patients	Blood Groups			
		A	B	O	AB
ALL ORGANS	709	251	219	204	35
GIT	322	110	107	90	15
Stomach	235	90	69	66	10
Colon	38	7	19	9	3
Rectum	19	4	4	10	1
Oesophagus	30	9	15	5	1
Hepato biliary	40	16	12	8	4
Liver	22	7	7	6	2
Gall bladder	6	0	3	1	2
Pancreas	12	9	2	1	0
Urinary System	47	21	9	12	5
Kidney	12	4	2	2	4
U. Bladder	25	11	4	9	1
Ca Prostate	10	6	3	1	0
Female genital tract	52	28	11	11	2
Ovary	16	10	2	4	0
Cervix	28	14	7	6	1
Ca uterus	8	4	2	1	1
Breast	46	12	17	16	1
Bronchus	49	10	16	19	4
Lymphomas & Leukaemias	101	36	29	33	3
NHL	26	14	5	6	
HD	5	2	3	0	0
ALL	33	8	14	11	0
AML	28	5	7	14	2
CML	9	7	0	2	0
Oral & upper airway	32	15	9	8	0
Cheek	9	3	3	3	0
Tongue	6	2	2	2	0
Tonsil	8	4	2	2	0
Larynx	4	4	0	0	0
Naso pharynx	4	1	2	1	0
Nostril	1	11	0	0	0
Miscelenius	20	3	9	7	1
MM	8	2	3	2	1
Bone	7	0	5	2	0
Neuroblastoma	2	0	1	1	0
Retinoblastoma	2	0	0	2	0
Skin	1	1	0	0	0

About half (323 / 709) of the patients recorded in the series had malignancies of gastrointestinal system mostly of stomach. 49 patients had Carcinoma of bronchus 46 patients were admitted with carcinoma of breast. Lymphomas and leukaemias accounted for 101 patients 47 patients had involvement of urinary system and 40 had lesions of hepatobiliary system.

In total there were 251 (35.4%) in group "A" 219 (30.88%) in group "B" and 204 (28.77%) in "O" group. Only 35 patients (4.93%) were from group "AB". Table-II shows, different distributions and relative frequency in population (study conducted at Chittagong) and their significance. It appears that Blood group "A" people have significantly higher incidence of malignancies.

Table – II

Showing Distribution of cancer patients (irrespective of types) according to blood group and their significance (n = 709)

Blood Group	Number & Percentage of patients in Group	Frequency in population in Group	P value
A	251 (35.40)	24.82	<.05*
B	219 (30.88)	30.23	>.5
O	204 (28.77)	37.71	>.1
AB	35 (4.93)	7.24	>.1

GIT malignancies

There were 322 cases of GIT malignancies recorded in this study. Of these 110 (34.1%) patients had blood group "A" 107 (33.2%) had group "B" and 15 (4.6%) from group "AB". Among the different groups Blood group "A" had significantly higher proportion of patients. Most patients in this study had carcinoma of stomach 235 of 322 (73%) followed by malignant lesions of colon and rectum 57 (18%) and oesophagus 35 (10%). Association of different blood group among these individual malignancies were calculated and presented in Table -3 and 4. It appears that incidence of carcinoma of stomach is significantly higher in Blood group "A" people. On the other hand Carcinoma oesophagus is significantly high in group "B" and low in Group "O". Malignancies of colon and rectum show no significant change among different blood groups.

Table – III

Showing Distribution of patients with cancer of GIT according to blood group and their significance (n = 322)

Blood Group	Number of patients in Group	Frequency in patients	Frequency in population in Group	P value
A	110	34.16	24.82	<.05*
B	107	33.22	30.23	>.1
O	90	27.95	37.71	>.1
AB	15	4.65	7.24	>.1

Table - IV

Showing Distribution of cancer patients with Carcinoma of Different parts of GIT according to blood group and their significance

Frequencies of different GIT Malignancies and their significance

Blood Groups and frequency in population	Ca Stomach (235)		Ca Oesophagus (30)		Ca Colon & Rectum (57)	
	Frequency	P value	Frequency	P value	Frequency	P value
A (24.&2)	90(38.29)	<.01*	9(30)	>.1	11(19.3)	<.1
B (30.23)	69(29.36)	>.5	15(50)	<.041*	23 (40.3)	<.05*
O (37.71)	66 (27.65)	>.1	5(16.6)	<.001*	19(33.3)	<.5
AB (7.24)	10(4.25)	>.1	1 (3.34)	>.1	4(7.1)	>.5

Hepatobiliary System :

Forty cases of malignancies involving liver, gall bladder & pancreas were included in this study. Of these twenty two patients had hepatocellular carcinoma, six had carcinoma of gall bladder and twelve carcinoma pancreas. (16 of 40) 40% patients was in group A, 12 (30%) and 8 (20%) were in group O. Group A patients have significantly higher and Group O patients have significantly low incidence of malignancies involving hepatobiliary system. Considering hepatocellular carcinoma, Group O have significantly low incidence. Table-V shows distribution in details.

Female genital tract :

Fifty two women were included with carcinoma of cervix and carcinoma ovaries. Of them 28 (53%)

were in group A, 11 in both B and O group and two in Group AB. Group "A" was found to be associated with significantly higher incidence of malignant lesions of female genital tract. On the other hand Group O showed significantly lower incidence. Carcinoma of cervix was also found similar higher incidence in Group A and low in Group O patients. Distribution of patients with malignancies of female genital tract according to different blood groups is presented in table VI.

Carcinoma bronchus is a common malignant tumor. 49 patients were included during this study. 46 cases of carcinoma breast and 47 cases of malignant lesions of urinary bladder, prostate and kidneys. Out of 49 cases of Bronchogenic carcinoma, 10(20.4%) were of Group A, 16 (32 %) of Group B, 19 (38%) of Group O and only

Table – V

Showing Distribution of patients of Hepatocellular carcinoma according to blood group and their significance

Blood Group & Frequency in population	Malignancies of Hepatobiliary System (N = 40)		Hepatocellular carcinoma (N =22)	
	Number & Percentage of patients in Group	P value	Number & Percentage of patients in Group	P value
A (24.82)	16(40)	<.01*	7(31.81)	> .1
B (30.23)	12(30)	> .5	7(31.81)	> .5
O (37.71)	8(20)	<. 01 *	6(27.27)	> .05*
AB (7.24)	4(10)	>.1	2(9.09)	>.1

Table – VI

Showing Distribution of patients with carcinoma of female genital tract & cervix according to blood group and their significance

Blood Group Frequency in population	Female genital tract (N = 52)		Carcinoma Cervix (n=28)	
	Number & Percentage of patients in Group	P value	Number & Percentage of patients in Group	P value
A (24.82)	28 (53.8)	<.001 *	14	<.001
B (30.23)	11 (21.1)	>.05	7	>.1
O (37.71)	11(21.1)	<.01*	6	<.01*
AB (7.24)	2(3.84) I	>.1	1	>.1

four were in Group AB. There was no significant change in distribution (Table-VII).

Almost similar distribution was observed among 46 patients of carcinoma breast included in this study. Significantly higher incidence of urological malignancy was observed in Group A patients. 21 of 47 patients included were of Group A. On the other hand incidence was significantly low in Group B and Group O.

Lymphoma and Leukaemia :

During this study 31 cases of lymphoma were recorded. Among them 16 (51 %) were of blood group A, 8 (25%) were Group B, 6 (19 %) in Group

O. Significantly higher incidence of lymphoma was observed in group A patients.

In total 70 patients in this study had leukaemia including AML, ALL and CML. 33 patients had ALL and 28 patients had AML.

20 (28 %) of 70 patients of leukaemia were in Group A, 21 (30%) in Group B, 27 (38%) were in Group O and only two in AB group. There was no significant change in distribution. But in ALL blood Group B had significantly higher incidence and in AML Blood group O had significantly higher incidence. Distribution of patients of leukaemia in different blood group is presented in table IX.

Table –VII

Showing Distribution of patients with Carcinoma of Bronchus, Breast and Urological Malignancies according to blood group and their significance

Blood Group & Frequency in population	Urological Malignancies System (N=47)		Carcinoma Breast (N = 46)		Carcinoma Bronchus (N=49)	
	Number & Percentage of patients in Group	P value	Number & Percentage of patients in Group	P value	Number & Percentage of patients in Group	P value
A (24.82)	21(44.7)	<.001	12(26.1)	>.1	10(20.4)	>. 1
B (30.23)	9(19.1)	<.05*	17(36.9)	>.1	16(32.6)	>.5
O (37.71) 1	12(25.5)	<.05*	16(34.7)	>.5	19(38.7)	>.5
AB (7.24)	5(10.6)	>.1	1(02.1)	>.05*	4(8.1)	>.5

Table - VIII

Showing Distribution of cancer patients with Lymphomas according to blood group and their significance (n =31)

Blood Group	Number & Percentage of Patients in Group	Frequency in population in Group	X ² lue	P value
A	16 (51.61)	24.82	28.92	<.001*
B	8 (25.81)	30.23	.65	>. 5
O	6 (19.35)	37.71	8.94	<.01
AB	1 (3.23)	7.24	2.22	>.1

Table – IX

Showing Distribution of cancer patients with Leukaemia according to blood group and their significance (n = 70)

Blood Group & Frequency in population	Leukaemias (N=70)		ALL (N= 33)		AML (N=28)	
	Number & Percentage of patients in Group	P value	Number & Percentage of patients in Group	P value	Percentage of patients in Group	P value
A (42.82)	20(28.57)	>.1	8(24.2)	>.5	5(17.8)	>.1
B (30.23)	21(30)	>.5	14(42.4)	<.05*	7(25)	>.1
O (37.71)	27(38.57)	>.5	11(33.4)	>.1	14(50)	< .05*
AB (7.24)	2 (2.86)	>.1	0	-	2(7.2)	>.5

Discussion :

In this study out of 709 patients with different types of malignancy 483 were male and 226 were female. Male and female ratio is 2.13:1. This ratio almost exactly correspond to the ratio of previous study⁹ of our country, where the ratio was 2.07:1. But it does not correspond to the ratio of previous study¹⁰ made by Alam et al which was 1.48: 1.

In this series, among 709 patient of malignancy of different types 251(35.4 %) are of blood group A, 219 (30.8%) are of blood group B, 204 (37.71) are of blood group O and 35 (4.93) are of blood group AB. But frequency of individual blood group in population conducted in Chittagong¹² is A (24.82), B (30.23), O (37.71) and AB (7.24) which is quiet different from blood group frequency in malignancy patients. This indicates statistically significant increased incidence of malignancy in blood Group A population.

Out of 235 cases of carcinoma of stomach included in this study, 90 (38.29%) is in A group, 69 (29.36%) is B group, 66 (27.65%) is O group and rest 10 (4.25%) is AB group. Incidence is found to be significantly high in A group individuals which co-relates with previous findings^{4,5}. Ca oesophagus is also found significantly higher in A blood group individuals, 15 (50 %) of 30 patients were blood group A, and lower 5 (16.6%) in blood group O. Ca colon and rectum is found to be significantly higher in Blood group B in this study. This association has not been reported.

In Hepato-biliary carcinoma out of 40 patients 16 (40%) are of A group, 12 (30%) are of B group, 8 (20%) are of O group and only 4 (10%) are of AB group. In these patients group A patient is found significantly higher and group O patient found significantly lower. 52 patients were included in this series had carcinoma of cervix and ovary. Out of them 28 (53%) were in group A, 11 in both B and O and 2 were in group AB. Group A was found to be associated with significantly higher incidence of malignant lesions of female genital tract and on the other hand group O showed significantly lower incidence. Findings in this study is similar to other studies reported^{4,5,11}.

49 carcinoma bronchus patients were included in this study. 10 (20.4%) were group A, 16 (32%) were group B, 19 (38%) of group O and only 4 (8.1%) were of group AB. Distribution was found similar to distribution in population. Earlier studies also did not report any of the blood groups to be associated with decrease or increase in frequency of carcinoma bronchus.^{4,5,11}

Out of 46 patients of breast carcinoma 12 (26.1%) are of group A, 17 (36.9%) a of group B, 16 (34.7%) O group, and 1 patient (2.3%) is of group AB. Only group AB patient is found significantly lower. No other group shows any association with Ca breast.

Significantly higher incidence of urological malignancy was observed in Group A patients. 21 out

of 47 patients included were of Group A. Similar finding was reported before¹¹. On the other hand incidence were significantly low in group B and Group O.

During this study 31 cases of lymphoma were recorded. Among them 16 (51%) were blood group A, 8 (25%) were group B, 6 (19%) in Group O. Significantly higher incidence of lymphoma was observed in group A. No association of lymphoma with group A patient was reported earlier.

In total 70 patients in this study had leukemia including AML, ALL and CML. 33 patients had ALL, 28 had AML, rest 9 patients had CML. 20 (28%) out of 70 patients of leukemia were Group A, 21 (30%) in group B, 27 (38%) were in Group O and only 2 (4%) in AB. No significant difference in distribution of patients was observed than distribution in population.

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References :

1. Issitt PD, Applied blood group serology. 3rd ed. Montgomery Scientific. Miami 1985
2. Rippee C. Myers J. Gindy L. Blood group in clinical practice of Transfusion Medicine 2nd ed. edted by LD P SN Swisher, Churchill Livingstone, New York, 1989.
3. Landsteiner K: Individual defference in human blood, Science 73 : 405, 193-1.
4. Reed ME, Bird GWG, Association of human red cell blood group & disease. Transf Med. Rev 1990; 4 : 47-85.
5. Gravity G. Blood group antigens &. disease. In : Garvatty G editor, Blood group Antigen & disease Arlington. American association of Blood Bank 1983.
6. Mourant AE et al. Blood groups & disease. Oxfosd: Oxford University Press, 1978.
7. Salmon C. Blood groups & other red cell surface markers in health & disease. New York, Maseon, 1982.
8. Huda MN, Cancer - A global Problem Editorial, JCMCTA 1994, 5 (S2); 4 - 5
9. Alam AMMS. et al; Cancer pattern in Bangladesh, A 3 years study, Bangladesh Medical Review Vol XVI. 2, P 3, July 1990.
10. Alam AMMS et al. Distribution pattern & probable echological factors of cancer in Chittagong 'An eight year hospital based study', JCMCTA 1999, 10 (54) : 3-28.
11. Issitt PD. & Anstee DJ. applied blood group serology, Fourth edition, Montgomery Scientific publication p 218-246.
12. Rahman MM, Islam MA; Afrose S , Haider S, Ahmed M, Hossain M. ABO blood group frequencies the Chittagon region of Bangladesh. Journal of Comilla Medical College Teachers's Association, July-2001; 3(2): 64-65.