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Original Research Article

Association of ABO Blood Groups in Relation to Gynaecological Cancers in Western Rajasthan

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ABSTRACT

Background: ABO blood group has been associated with risk of several malignancies. However, results are not consistent and are contradictory. The goal of this retrospective analysis study was conducted for analysis to access ABO blood groups potential role of in GIT carcinoma.
Materials and Methods: The study was conducted in the Department of Physiology in collaboration with the Department of Radiotherapy at Mathura Das Mathur Hospital of Dr. S. N. Medical College, Jodhpur (Rajasthan), on 256 clinically diagnosed gynaecological cancer patients, regardless of menopausal status, age, body mass index, oral contraceptive use or family cancer history. Study period was from September 2006 to March 2008. The standard agglutination test was used to determine the blood groups. This is hospital based observational type study. The statistical association of ABO blood groups and risk of gynaecological cancers was found out with Odd Ratios (OR) with 95% confidence interval (CI).
Results: Gynecological cancers was minimum found in women having blood group AB [ORs 1(95% CI, 0.568- 1.760)] and maximum cancers was found in blood group A [ORs 4.360(95% CI, 2.703-7.032)].
Conclusion: The association between ABO blood groups and gynecological cancers was significantly found higher in blood type A, followed by B, O. Minimum association of gynecological cancers were found in blood type AB.

Keywords: ABO blood type and cancers, gynecological cancers, ovarian cancer and blood type, cancers and blood group, uterine cancer and ABO blood group.

INTRODUCTION

ABO blood group has been associated with risk and survival of several malignancies, including pancreas cancer, [1] and stomach cancer, [2] but the mechanism is complex and unclear. Blood group antigens may influence the systemic inflammatory response, [3-6] that has been associated with the malignancies. Second, blood group antigens are expressed in many other tissues, including breast ductal cells, lobular cells and even some malignant cells. [7] The ABO antigen expressed on the surface of malignant cells appears to be different from the antigen expressed on normal tissue. [8-9] The different expression of antigens on the surface of cancer cells might alter motility, apoptosis and immune escape. [10] These mechanisms might influence the initiation and spread of malignancies.

Several studies have shown an association between ABO blood types and certain cancers. [11-13] Researchers found that among the gynecological tumors, group A blood type was associated with ovarian, endometrial and cervical cancers and with

poor prognosis for ovarian and endometrial cancers. ABO type antigens are expressed at low levels in normal cervical tissue but are expressed at higher frequency in cervical carcinoma tissues. Cui and collaborators reported the presence of an A-like antigen (MRG-1) in cervical tissues and suggested that persons lacking anti-A antibodies are more susceptible to tumors since they do not have antibodies, which can destroy tumor cells. [14]

Several studies from elsewhere have suggested an association between ovarian cancer and blood group A as a genetic marker. [15- 28]

The loss or presence of blood group antigens can increase cellular mortality or facilitate the interaction between tumor cells and endothelial cells of distinct organ. [29] Sakamoto, [30] studied the implication of ABO blood group antigens in uterine and cervical carcinoma and concluded that the disappearance of A or B antigens may correlate the invasiveness of lesion and maximum uterine carcinoma was found in association with blood group A. Other studies also suggest that ovarian cancer have also strong association with blood group A. [31]

The present study is an attempt to correlate ABO blood groups frequency and to assess the utility of ABO blood group in relation to gynaecological cancers as a preclinical tumor marker. Thus, the objectives of this study were to document ABO blood group of patients suffering from malignancies of different gynaecological organs and to describe the association of malignancy with ABO blood group in Western Rajasthan.

MATERIALS AND METHODS

This is a retrospective hospital based study conducted in Mathura Das Mathur Hospital in Jodhpur, Rajasthan from September 2006 to March 2008. A total of 246 consecutive confirmed diagnosed gynaecological cancer patients were enrolled in this study as patient group. The study was approved by Ethical Committee and Institutional Review Board of Dr. Sampurnanand Medical College, Jodhpur under Rajasthan University of Health Science, Jaipur.

A written informed conscious 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 Radiotherapy Department of Mathura Das Mathur Hospital, Jodhpur.

Inclusion criteria for the cases were as follows:

Pathologically confirmed diagnosis of gynaecological cancers, laboratory data available for ABO blood type and detailed record of disease, course and history

Exclusion criteria:

Familial cancer history, dietary habits, drinking alcohol had been taken.

Initially all patients completed a detailed questionnaire regarding their diet and habits, submitted to thorough history taking, detailed physical examinations and performed routine radiological and laboratory investigations including complete blood count (CBC) and tumor markers for gynaecological cancer.

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

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 labeled 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. [32]

Sample size determination:

The sample size was determined by using the formula for comparing the difference of means between the groups with $\alpha = 0.05$, power = 80% and es = 0.25. [33]

es = largest difference between any two groups to be detected / expected within the group Standard Deviation

es =diff / SD; Sample size = 246

Accordingly we found that the sample size of 246 of gynaecological cancer patients would be more useful for our study purpose.

Statistical Analysis:

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

RESULTS

Table-1: Distribution of cancer cases of female reproductive organs.

S No	Organ affected with malignancy	No. of cases	Percentage
1.	Cervix cancer	140	56.91
2.	Ovarian cancer	55	22.35
3.	Uterine cancer	47	19.10
4.	Vulva cancer	04	1.62
	Total cancer cases	246	

Table 1 described data on 246 women who were suffered from different types of gynecological cancers and their ABO blood groups was analyzed. In the present study, there were 246 gynecological cancer cases out of which maximum cancers were cervical cancer cases [n= 140; 56.91%],followed by 55 ovarian cancer [22.35%], 47 were uterine cancer cases [19.10%] and only 4 cases of vulva cancer [1.62%] were detected.

Table-2: ABO blood groups in relation to different types of gynecological cancers with odd ratios (ORs) and 95% confidence interval (CI).

S.No	Cancers with no. of cases	Blood group A		Blood group B		Blood group O		Blood group AB	
		No of cases	ORs with 95% CL	No of cases	ORs with 95% CL	No of cases	ORs with 95% CL	No of cases	ORs with 95% CL
1	Cervix cancer (140)	44	4.889(2.45-9.757)	52	6.303(3.181-12.490)	32	3.160(1.552-6.436)	12	1(0.433-2.309)
2	Ovarian cancer (55)	21	5.044(1.842-13.811)	13	2.528(0.883-7.234)	15	3.062(1.O88-8.620)	06	1(0.302-3.316)
3	Uterine cancer (47)	19	2.865(1.129-7.271)	15	1.979(0.765-5.122)	04	0.395(0.112-1.379)	09	1(0.358-2.794)
4	Vulva cancer (04)	02	-	01	-	01	-	-	-
	Total cancer cases(246)	86	4.360(2.703-7.032)	81	3.982(2.464-6.436)	52	2.174(1.314-3.597)	27	1(0.568-1.760)

Table 2 described a total of 246 gynecological cancer cases, maximum cancer cases were found in blood group A (n=86), followed by blood type B (n=81), O (n=52), and least were found in blood type AB (n=27).

In 246 cancer cases, in reference to blood group AB [ORs 1 with 95% CI, 0.568-1.760], blood group A [ORs 4.360 with 95% CI, 2.703-7.032] having 4.36 times higher association with cancers; that is significant result, followed by blood group B [ORs 3.982 with 95% CI, 2.464-6.436], and blood type O [ORs 2.174 with 95% CI, 1.314-3.597].

Out of 140 cervical cancer cases, in reference to blood type AB {(cases-06), [ORs 1 with 95% CL, 0.433-2.309]}, maximum cancer cases (52) were found in blood group B [ORs 6.303 with 95% CI, 3.181-12.490], followed by blood type A (44 cases), [ORs 4.889 with 95% CI, 2.45-9.757] and blood type O (32 cases), [ORs 3.160 with 95% CI,1.552-6.436].

In overall 55 ovarian cancer cases, maximum cases (21) were associated with blood type A [ORs 5.044 with 95% CI, 1.842-13.811], in reference to blood group AB (n=06) [ORs 1 with 95% CI, 0.302-3.316], followed by blood group O (15cases)[ORs 3.062 with 95% CI, 1.088-8.620] and B (13 cases), [ORs 2.528 with 95% CI, O.883-7.234].

47 uterine cancer cases were detected in the study and in reference to blood type O (04 cases), which having minimum number of cases [ORs 0.395 with 95% CI, 0.112-1.379], blood type A (19) [ORs 2.865 with 95% CI, 1.129-7.271] having 2.86 times higher association with uterine cancers than blood group O individuals followed by blood type B (15 cases) [ORs 1.979 with 95% CI, 0.765-5.122] and AB (09 cases) [ORs 1 with 95% CI, 0.358-2.794]. Vulva cancer was minimum in number.

DISCUSSION

This study concluded that blood group A women were more associated to gynecological cancers and blood type AB having least association of risk of gynecological cancers. In cervical cancer blood group B having 6.3 times higher risk than blood type AB. Blood group A associated with 5.04 times higher risk for ovarian cancer than in blood type AB, followed by O (3.06 times) and B (2.865 times) blood type. In uterine cancer blood type O (0.3) having least association of risk of cancer. But blood group A having 2.86 times and blood type B having 1.97 times higher risk for uterine cancer. No much more vulva cancer cases were found. Only 2 vulva cancer cases were associated with blood group A and only 1 case associated with blood type B and 1 case with blood type O. No cases were found with blood type AB individuals.

Specific red blood cell antigens have been associated with infection, immune response and disease condition, especially cancers. D'Adamo reported that cancers in general tend to be associated with blood group A and slightly less strongly with blood group B. In contrast, individuals with blood group O appear to be more resistant to the development of cancers. [34] Blood group ABH expression on cervical cancer cells has been linked with improved prognosis and shown to be a predictor of patient survival. [35]

One suggested mechanism by which women of blood group A might be at higher risk of cancers involves diminished immunological surveillance. Some tumors, notably of the stomach and colon, express the Forssmann antigen which is structurally similar to the A antigen determinant. People with blood groups other than A produce anti-A antibodies. Because of structural similarity, these antibodies might also attack precancerous or cancerous cells expressing the Forssmann antigen. Thus, some people of blood group A may have a diminished immune response to the tumour. [36]

Three variant alleles of ABO gene on chromosomes 9q34 determine a person's blood type by encoding three glycosyltransferases with different substrate specificities. The ABO blood groups are defined by carbohydrate moieties displayed on the surface of red blood cells and attached to a protein backbone known as the H antigen. [37] Glycosyltransferases are also important mediators of intercellular adhesion and membrane signaling. They play important roles in malignant progression and spread. [38] In addition these surface molecules have been associated with the host immune response and may have a role in facilitating immunosurveillance for malignant cells. [39]

The expression of histo-blood group A antigen has been reported to increase resistance to apoptosis and facilitate escape from immune control in rat colon carcinoma cells. [40] In colon cancer, a weak association with A group and an altered blood group antigen expression related to progression of malignancy has been reported. The authors also propose that there is a small association between blood type A and cancer development. Type A individuals appear to be at a moderately increased risk for many cancers. Deletion or reduction of histo-blood group A or B antigen in tumors of A or B individuals is correlated with the degree of malignancy and metastatic potential in many types of human cancers. [41]

The functional significance of ABO blood group distribution might be associated with biological characteristics such as differentiation, mean size of the tumor, venous invasion, and TNM stages of esophageal squamous cell cancer. [42]

In addition to their expression on the surface of red blood cells, the ABO antigens are highly expressed on the surface of epithelial cells of the gastrointestinal, bronchopulmonary, and urogenital tracts. Pathology studies have demonstrated the deletion and the novel expression of A, B, and H antigens on the surface of pancreatic cancer cells compared with surrounding normal ductal cells, [43-46] suggesting that alterations in glycosyltransferase specificity may occur during pancreatic tumorigenesis. [47] Glycosyltransferase specificity has broad implications, beyond defining ABO blood type. Glycoconjugates are important mediators of intercellular adhesion and membrane signaling, two processes integral to malignant progression and spread. [38] In addition, these surface molecules are recognized by the host immune response and may have a role in facilitating immunosurveillance for malignant cells. [48-49]

***Limitations*:** Because of resource constrain, small sample size and short time duration for the present study, the another view that 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 gynaecological tumors have more chance to thrive and maximum found in blood group A patients than those in other blood group

CONCLUSION

Although there are probably over a thousand publications on the associations of blood groups and disease, many are based totally on statistical analyses. Most of the earlier studies have been controversial, because they were small studies and/or had inadequate controls and/or had been analyzed incorrectly. Nevertheless, it is difficult to argue with the general pattern that emerges from the large body of statistical data on malignancy, coagulation and infection. Some of the findings on microbe receptors, and the association with important immune proteins are most convincing and suggest that blood group antigens do play an important biological role: A role that is often completely unrelated to the red blood cell. It can be said at the outset, that cancers in general tend to be associated with group A, and slightly less strongly with group B.

In summary, further follow-up studies are required to clarify the role of predictive markers of risk in development of different types of gynaecological cancer.

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