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Original Research Article

Association of ABO Blood Groups and Infertility

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ABSTRACT

OBJECTIVES:

1. To study the distribution of ABO blood groups among infertile couples and compare it with fertile couples.
2. To examine any association of ABO blood groups with infertility
3. To compare the incidence of ABO incompatibility among infertile and fertile couples

MATERIALS AND METHODS:

This study was carried out in a tertiary care teaching hospital. The study population was divided into two groups-

GROUP A included 100 couples with unexplained primary infertility.
GROUP B included 100 fertile couples as controls.

Blood group of all individuals was confirmed by slide agglutination method.
The distribution of ABO blood groups in both the study groups was analyzed and compared. The incidence of ABO incompatibility (i.e.) when wife and husband have different blood groups was also compared among both the groups. Statistical analysis was done by chi square test. The result was considered significant when p value was < 0.05

RESULTS:

The overall ABO distribution among the infertile and fertile groups was not significantly different. ABO incompatibility between the male and female partner was also not significantly higher in the infertile group as compared to the fertile group.

CONCLUSIONS:

ABO blood group or ABO incompatibility is not directly associated with infertility.

KEY WORDS: ABO incompatibility, reproduction, blood group antigens, infertility.

INTRODUCTION

Karl Landsteiner was the first person to put forward the ABO blood group system in 1901. [1] According to the international society of blood transfusion (ISBT), there are about 250 blood antigens which have been divided into 29 blood group systems. [1] The ABO blood group antigens is considered as the major and clinically significant blood group system. [1] Apart from the importance of ABO blood groups in blood transfusion, the ABO blood group system has been associated with several diseases.

Several studies have reported or cited references of association of ABO blood groups with diseases which is shown in Table 1. This study was carried out to establish any possible association of ABO blood groups with infertility.

Table-1: ABO blood groups and diseases

S.No	Disease associated	Type of associated risk	Blood group
	Squamous cell carcinoma of skin.[2]	Low	O
	Basal cell carcinoma of skin.[2]	Low	O
	Pancreatic cancer[3, 4]	Low	O
	Ovarian cancer[5]	High	B
	Gastric cancer[6]	High Low	A O
	Breast cancer[7]	High	O
	Cervix cancer[7]	High	B &O
	Lung cancer[7]	High	B
	Buccal cancer[7]	High	B
	Venous thromboembolism[8]	High	A,B,AB
	Malaria[8]	Low	O
	Cholera & GI infections by E.coli[8]	High	O
	Smallpox[8]	High	A
	Plague[8]	Low	O
	H.pylori infection &GI Ulceration[8]	High	O
	Ischemic heart disease[9]	High	AB
	Otitis media with effusion[10]	Low	O

MATERIALS & METHODS

This study was carried out in a tertiary care teaching hospital .The study population was divided into 2 groups.

GROUP A consisted of 100 couples with unexplained primary infertility. Only couples with normal investigations were included in the study. The investigations included pelvic sonogram, hormone profile (pertaining to infertility), tests for ovulation and tubal patency of the female partner and semen analysis of the husband. A detailed sexual, occupational, medical and surgical history was recorded. Both the partners underwent routine clinical examination.

GROUP B: 100 fertile couples with at least one live issue were taken as controls.

Blood group of all individuals was confirmed by slide agglutination method.

The distribution of ABO blood groups in both the study groups was analyzed and compared. The incidence of

ABO incompatibility (i.e.) when wife and husband have different blood groups was also compared among both the groups.

Statistical analysis was done using chi square test. The result was considered significant when p value was <0.05.

RESULTS

The mean age of women in infertile group was 26.3 years and in control group was 26 years. The mean age of men in infertile group was 29 years and in control group was 28 years.

The ABO blood group distribution of the female and male partners in both the groups is summarized in TABLE2 AND TABLE 3.

TABLE 2: ABO blood group distribution of female partners

BLOOD GROUP	GROUP A (INFERTILE GROUP) N=100	GROUP B (FERTILE GROUP) N=100	χ^2	P VALUE	SIGNIFICANCE
A	22	22	0	1	NS*
B	29	31	0.19	0.67	NS*
AB	5	7	0.61	0.43	NS*
O	44	40	0.67	0.41	NS*

*NS-not significant

TABLE 3: ABO group distribution of male partners

BLOOD GROUPS	GROUP A (Infertile group) N=100	GROUP B (Fertile group) N=100	χ^2	P value	Significance
A	23	23	0	1	NS*
B	27	31	0.19	0.67	NS*
AB	7	6	0.18	0.67	NS*
O	43	40	0.38	0.54	NS*

*NS-not significant

The above tables show that there is no significant difference in the distribution of ABO blood group distribution among both the groups.

The incidence of ABO incompatibility between partners among both the groups is shown in table 4. No significant difference in ABO Incompatibility was found among both the groups.

TABLE 4: ABO incompatibility in infertile couples and control couples

ABO INCOMPATIBILITY	GROUP A INFERTILE GROUP TOTAL N=100	GROUP B FERTILE GROUP TOTAL N=100	χ^2	P VALUE
	79	75	0.85	0.36

DISCUSSION

ABO blood group antigens are the clinically most important and major antigens in most clinical situations. These antigens are present on the surface of RBCs. The expression of these antigens is genetically inherited from the parents. The inheritance of blood group is controlled by expression of three alleles which results in four phenotypes - A, B, AB and O. The

distribution of ABO blood groups among the Indian population, as found in several studies is shown in table 5.As in most studies [11-13] O group was the commonest group identified in the study population.

Total study population=200 males+200 females = 400
No. of subjects with O group=44 +40+43+40 =167
% of population with O group = 41.75 %

TABLE 5: ABO BLOOD GROUP DISTRIBUTION AMONG INDIAN POPULATION (in %)

S.NO	O GROUP	A GROUP	B GROUP	AB GROUP	AUTHOR
1.	38	40.5	19	2.5	Matthew NT[11]
2.	39.11	23.43	31.35	6.11	Swadesh A[12]
3.	37.96	24	31.03	6.99	Bhat et al[13]
4.	38.5	22.9	32	6.6	Latoo et al[14]
5.	38.6	32.7	18.9	5.3	Das et al[15]
6	41.75	22.42	29.5	6.33	Present study

Many studies have reported the association of ABO blood groups with several diseases. This study was undertaken to find any association of ABO blood groups with infertility. In the present study, there was no statistically significant difference of ABO blood group distribution among the infertile and fertile men and women. Solish et al [16] in his study on distribution of ABO blood types among fertile and infertile women did not find any relation between ABO blood group distribution between husbands and wives of infertile and fertile group. Sigler et al [17] in his study on association of Lewis blood group with infertility found that the difference in A, B, AB, O phenotype distribution was not statistically different between the infertile and fertile groups. However, Shoaib khan et al [18] has found in his study on blood groups and male infertility, that blood group O is strongly related to male infertility.

Parental ABO incompatibility has been implicated as a possible contributor to infertility. The basis for this theory may be the presence of seminal blood group antigens in secretors which could lead to antisperm antibodies in the cervical mucus and hence could lead to infertility. Several studies have been undertaken to evaluate the association of ABO incompatibility with infertility. Behrman SJ et al [19] (1960) found that 30-40% of infertile couples have ABO incompatibility and has concluded that ABO incompatibility between partners is a significant contributor to infertility. T M Allan [20] in his study on association of ABO blood groups and human fertility found no relation between ABO incompatibility and infertility. Similarly, Solish et al [16] has concluded in his study that parental ABO incompatibility is not related to infertility. In the present study, ABO incompatibility was not a significant contributor to infertility. Omu et al, [21] Ogbimi et al, [22] Schwimmer et al [23] and Cantuaria [24] have conducted studies to find the association of ABO blood group antigens with antisperm antibodies in infertile couples. They have concluded that ABO blood group antigens do not significantly contribute to cervical antisperm antibody formation or infertility.

Solish et al (1968) [25] in his study on distribution of ABO isohaemagglutinins among fertile and infertile women found that the titer of cervical haemagglutinins was highest in O blood group women than A or B blood group. However, he found that the frequency of finding cervical haemagglutinins was higher in fertile women than among infertile women. Ogbimi et al [22] has suggested that there

might be some measure of low zone tolerance to ABO antigens on spermatozoa and therefore ABO incompatibility might not significantly contribute to infertility.

Association of parental ABO blood group incompatibility with recurrent or spontaneous abortions is also controversial. Lauristen JG et al [26] and Solish et al [16] have concluded that blood group incompatibility is not an important etiology in the causation of spontaneous abortions. On the contrary, Ghasemi et al [27] found that couples with recurrent pregnancy loss had significantly higher incidence of parental ABO incompatibility than fertile couples. Studies have demonstrated higher fetal wastage, neonatal complications, and neonatal deaths in fetomaternal ABO incompatibility. [28-30]

CONCLUSIONS

ABO blood group phenotypes or ABO incompatibility of partners is not a significant contributor to infertility. However, large scale studies are suggested for comparison so that appropriate intervention strategies can be followed.

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