



## PREVALENCE OF GENETIC LINKAGE IN PARENTS AND CHILDREN'S BLOOD GROUP

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### Abstract

**Aim and Background:** The purpose for which the survey was undertaken was with an objective to find out the prevalence of ABO linkage between parents and children's blood group. Blood is heterogeneous fluid circulating in the body continuously and having various important function along with CVS it is significant called as an effective transport system of the body.

**Methods:** The survey was conducted for a total of 100 college students of AHS department, they were responded through online survey using questionnaire for data collection.

**Result:** The study showed that among these 100 students, 46 similar with their father's blood type, 23 similar with mother's blood type and 21 students' group did not match with their parent's blood type. Also, the commonest prevalent group is 'B' positive and least prevalent group was 'AB' negative.

**Conclusion:** From this survey we concluded that among 100 students, 51 were female and 49 males, it was found out that most of the female students resembles with their father's blood type and reciprocally male students resemble with their mother's blood type. Hence an individual's blood type is inheritance as like eye, hair color inherited from our parents.

**Key Words:** ABO blood group, parent, students, inheritance

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### INTRODUCTION

Volume of blood is 5 - 6 liters in an individual weighting 70 kg or 70 - 80 ml per kg body weight. Viscosity of blood 5 times more than water. PH of blood 7.38 - 7.42. Blood can be majorly divided into cell and plasm. The cells of the blood form about 45 % of the total blood volume and it's called as packed cell volume (PCV) or hematocrit. The packed cell volume consists of 3 different types of cells. They are erythrocytes or red blood corpuscles, leukocytes or white blood corpuscles, platelets (thrombocytes). Plasma is a clear straw colored fluid and forms 5 % of the total blood volume, which has water 91% and solid 9% of solids. Solid comprise both inorganic and organic substances.

There are four important blood group types A, AB, B and O. Blood groups of a person are genetically determined and are divided based on the specific antigens that seen on the surface of red blood cells (RBCs). These blood group follow the mendelian law of inheritance and have strong characteristics.

These antigens forms in the early embryonic period and continuous throughout the life consistently. Among many blood group systems that have been reported by the International Society of Blood Transfusion, ABO and Rh systems are contemplated as the most important blood group systems. There are two major blood group systems play a significant role in blood transfusion and organ transplantation around world wide. Australian scientist Karl Land steiner was awarded Noble prize for his work in discovery of ABO System in the year of 1930 and he was also awarded for his work of discovery of Rh system in the year 1940. In the ABO blood group system antigens, A and B are firmly immunogenic in state and are presented on the surface of RBCs at the same time the antibodies anti- A and anti- B are present naturally in the plasma of person whose RBCs lack the equivalent antigen. The person who has Antigen "A" on his/her Red Blood cell has the Blood group type "A", while if the person has the Antigen "B" on his /her RBC then has the Blood group type as "B". If the person has both Antigens, "A" and "B" on his /her RBC has the Blood group, "AB". If both, "A" and "B" Antigens are lacking in the Red Blood Cells, then the person has the Blood group "O". Scientifically each parent inherits ABO gene to their child. In this genes A and B are dominant whereas O is recessive. If one parent with O Group has 2 O genes, while other parent have B group have 2 B genes, will have offspring with B blood type with one O gene and one B gene. Like wise, our blood type is inherited from our parents.

Although, many research, survey and studies have been conducted in diverse parts of India to find the ABO and Rh system distribution. The present Pilot study was small attempt made to provided at a on ABO and Rh blood group distribution. The present study was conducted among total of 100 subjects of college students were included via online survey. Data collected and the frequency of ABO blood groups was calculated in numbers and percentages. The present study determined that among the ABO grouping system the highest percentage of blood group was found to be group B positive, followed by group O and group A. The least common blood group was found to be AB group.

The research about the blood group linkage among parent and children relationship of ABO blood grouping. The present survey was aimed to provide data about the prevalence of ABO blood group distribution among parents and children.

## MATERIALS AND METHODS

The present survey was conducted in the Department of Allied Health Science, Tagore medical college, Chennai district, Tamil Nadu, India. The survey was conducted during May 2022. Totally, 100 AHS students from five departments (Optometry - 22, MLT- 17, Cardiac technology - 23, Physician Assistant - 19, Dialysis Technology- 19) are involved in this present survey. A self-questioner was prepared and it contains demographical data and details of blood group. The data collected was analyzed and the percentage of Blood group matching between the Parents and Children was tabulated in department wise and Gender wise. Data was collected by online questioners which contains consents form, demographical data and detail of their and their parents blood group. Study setting in Tagore medical college and hospital, Rathin Mangalam Chennai- 6000127, Tamil nadu, India. Total number of students participated 100.

### Inclusion Criteria

- Both male and female included
- Healthy individual between age of 17 to 22

### Exclusion Criteria

- No exclusion criteria

### Procedure

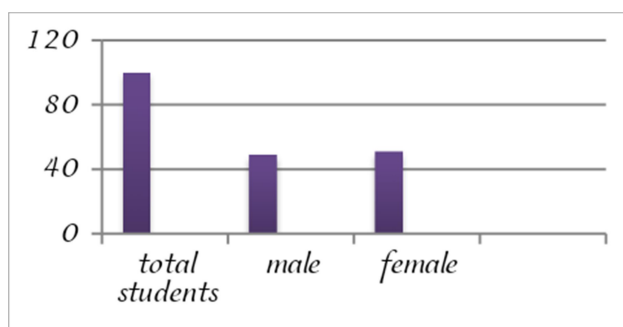
#### Number of students participated in research

The aim of the present study was decided to study the linkage between Parents and Children Blood Group among college student in Department of AHS, Tagore medical college Chennai district, Tamil Nadu,

India. The present survey is entirely a Statistical survey. Totally, 100 students are involved in the present research. From that 100 students, 49 students are Male and 51 students were Female

**Table 1: Number of students participated in Present survey**

1	Total number of students participated in present study	100
2	Males	49
3	Females	51



**Graph.1**

### Students Blood Group details

The Blood groups of the college students in Tagore medical College was collected from the students and the data was furnished in **Table–2**. However, among the eight Blood groups, maximum found blood group among the AHS Department students was “B-Positive” (37 students) followed by “O - Positive” (33 students), “A- Positive” (18students), “AB -Positive” (7students), “B - Negative” (1students), “O-Negative”(1students)and “A-Negative”(2student).In our study, we did not find any students with “AB - Negative” Blood group. Similarly, Positive Rh Typing of Blood groups are noticed more when compared to the Negative Rh type Blood groups.

### Details of the Students Blood Groups and Gender

The details of the student Blood Group and gender were analyzed and the findings are tabulated in **Table – 3** .For male students, highest percentage of Blood group was observed as B +ve, 40%followedbyO + being 36%, followed A+ve14%,AB +ve6%and A -ve2%.ThegroupO -ve, B – ve, AB – ve were not found among the Male students. Comparatively for Female students, highest percentage of Blood group was observed as B +ve”33 % followed byO+ve29 %, A +ve21 %,AB +ve”7%,O–ve2%andB-ve2%A-ve 3%.TheBlood group AB-ve were not seen in the Female students of Tagore college.

### Blood group matching between the Parents and Children in department wise

The Blood group matching between the Parents and Children in department wise was surveyed in the present study and the results are tabulated in**Table–4**.Among the100 surveyed college students, 28 student(28%)blood group matched with Mother’s blood group type, 49 student(40 %)bloodgroup are matched with Father’s blood group type and13student (13%)blood group were not similar with Father and Mother blood groups.

### Genderwise matching of Blood group among the Parents and Children

Gender wise matching of Blood group between the Parents and Children was recorded in the present study and the data was tabulated in **Table–5**.We studied that, most of the Female student blood groups matched with their Father’s blood group type(Male – 40%; Female – 50%). Reciprocally, Male student

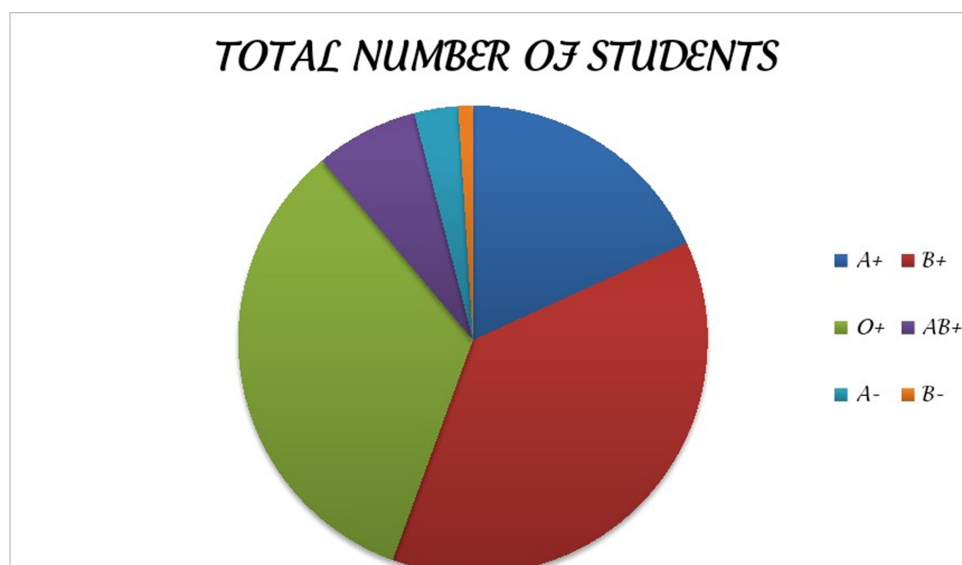
blood groups are matched with their mother's blood group (Male – 38 %; Female – 27%). In male student, 20%of students blood group was not matched with their father and Mother blood group. Comparatively, 21% of female students have noticed to be neutral matching of Blood group and their blood group was also not matched with their Father and Mother blood group.

### Statistical Analysis

Data on the frequency of ABO blood groups was analyzed in numbers and percentages Percentage for ABO blood groups distribution is tabulated.

**Table 2: Students blood group details**

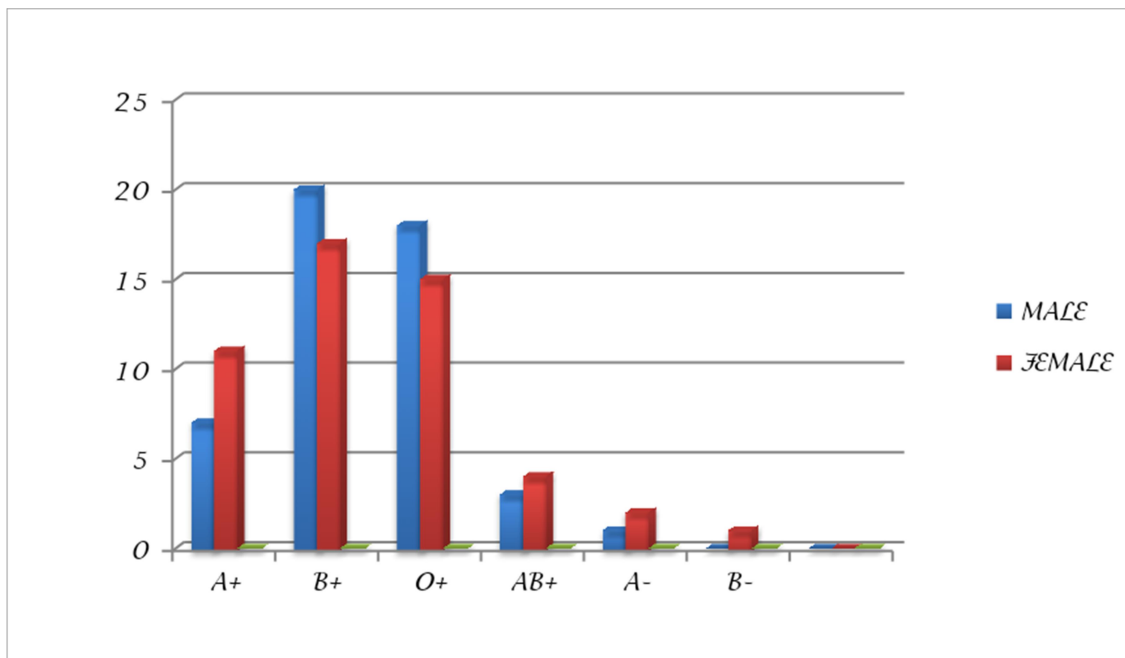
S.No	Blood Groups	No.Of Students
1.	A+	18
2.	B+	37
3.	O+	33
4.	AB+	7
5.	A-	3
6.	B-	1
7.	O-	1
8.	AB-	0
	<b>Total no .of students</b>	<b>100</b>



**Table 3: details of students blood group genderwise**

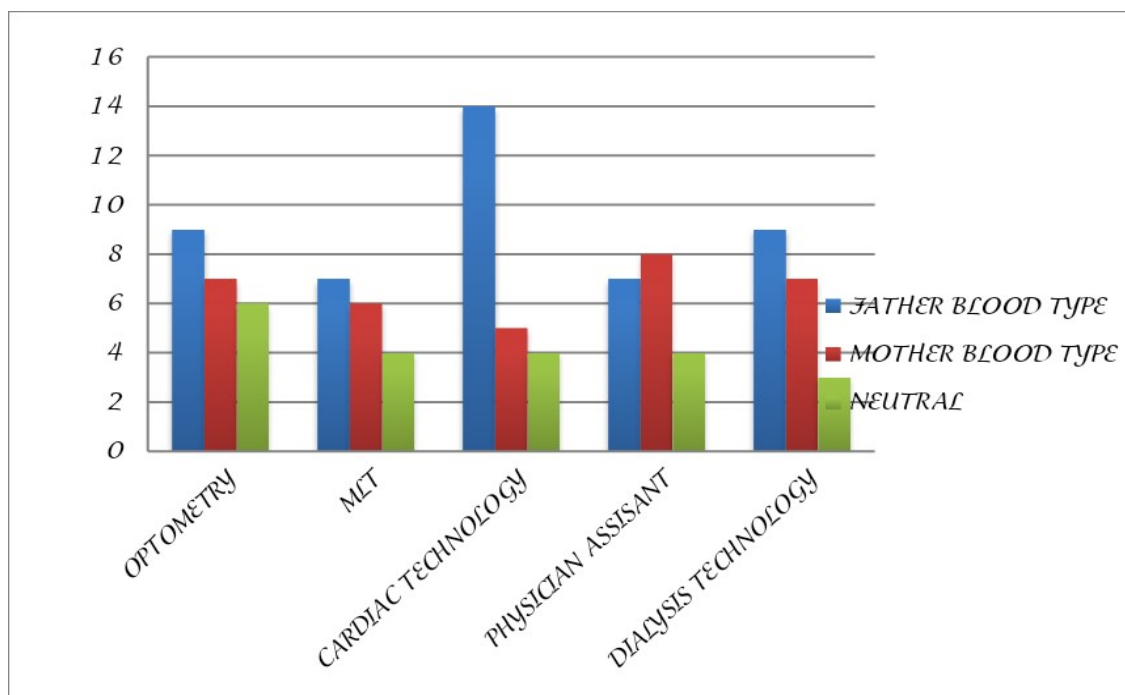
S.No	BLOOD GROUP	GENDER WISE	
		MALE	FEMALE
1			
2	A+	7(14%)	11(21%)
3	B+	20(40%)	17(33%)
4	O+	18(36%)	15(29%)
5	AB+	3(6%)	4(7%)
6	A-	1(2%)	2(3%)
7	B-	0	1(2%)

8	O-	0	1(2%)
9	AB-	0	0
10	<b>T</b>	<b>49 BOYS</b>	<b>51 GIRLS</b>



**Table 4: Blood Group Matching Between Parents And Children In Department Wise**

S.No	Department	Father'S Blood Group Matching	Mother'S Blood Group Matching	Not Matching
1.	Optometry	9	7	6
2.	Mlt	7	6	4
3.	Cardiac Technology	14	5	4
4	Physician Assistant	7	8	4
5.	Dialysis Technology	9	7	3
	<b>Total</b>	<b>49 Students</b>	<b>28 Students</b>	<b>23 Students</b>



**Table: 5 Parental Matching Of Blood Group According To Genderwise**

	Department	Father' S Blood Group Match	Mother'Sblood Group Match	Not Matching
1.	Optometry	Male-3 Female-6	Male-3 Female- 4	Male-1 Female-5
2.	Mlt	Male-4 Female-3	Male-3 Female-3	Male-4 Female-0
3.	Cardiac Technology	Male-5 Female-9	Male-4 Female-1	Male-1 Female-3
4.	Physician Assistant	Male-5 Female-2	Male-5 Female-3	Male-3 Female-1
5.	Dialysis Technology	Male-3 Female-6	Male-4 Female-3	Male-1 Female-2
	Total	Male-20(40%) Female-26(50%)	Male-19(38%) Female-14(27%)	Male-10(20%) Female-11(21%)

## RESULT

The linkage of ABO blood groups among parent and child in 100 college students. The percentage of A, B, AB, and O blood group among the survey subjects shown in Table 2. The distribution of ABO and Rh- D blood groups was recorded among 100 student of AHS department. Highest percentage of blood group was found to be group B, followed by group O and group A. The least type of blood group was AB group.

## DISCUSSION

In current study we showed that there was a linkage between parents and children blood group. In other words, blood group of one of the parent matches with their children, some children have genetic linkage with their ancestral blood type. The blood in compatibility is a major cause for the outbreak of haemolytic disease if not treated leads to chronic damages to the central nervous system. The insult to the CNS will increase the possibility of miscarriage, paralysis of extremities, cerebralpalsy and intellectual disorder. The most common blood type in both groups was B. This result coincides with the study conducted by Kruthi A Raja et al (2016). The inheritance of the genes from the parents depends upon the pair of alleles which can be either homozygous or heterozygous, based on the combinations the offspring or the child gets a particular blood type. In this study it was noted that most of the males inherited fathers blood group and females inherit mothers blood group, A study done by Oka Y, Niikawa N et al who studied the genetic inheritance of ABO blood group stated three reasons for inheritance of the fathers gene, the apparent AB mother might be an A1/B chimera whose genotype was BO; (2) the mother and the father might be heterozygous Hh, thus the apparent O daughter could be hh; (3) red cell membrane components related to the blood group expression could be abnormal in the family, and the apparent O daughter could be a homozygous status of the membrane abnormality. This reason could not be generalized as it pertains to the genetic study of a single family, a more elaborate cohort study would exactly demystify the reason why this inclination exists as more of females get their fathers blood group and sons their mothers

## CONCLUSION

From the present study, we concluded that among the eight Blood groups, most commonly observed Blood group among the college students was "B-Positive". Positive Rh Typing of Blood groups were recorded more common among the students when relative to the negative Rh Typing Blood groups. For boys, highest percentage of Blood group was noticed as "B –Positive" likewise, for girls, highest percentage of Blood group was recorded as "B –Positive". Among the 100 surveyed college students, 46 student blood group are matched with father's blood group, 23 student blood group are matched with Mother's blood group and 21 student blood group did not match with their parent's blood group. Most of the male student blood groups are similar with their Mother's blood group and female student blood group are similar with their father's blood group.

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