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Research Article

### FREQUENCY OF ABO AND RH BLOOD GROUPS AMONG BLOOD DONORS GUJRANWALA, PUNJAB, PAKISTAN

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**Abstract:**

**Purpose.** The main purpose of blood transfusion centers is the provision appropriate blood components that the patient needs by preparing certain blood components. Therefore, the blood group is at the top among the routine work of blood transfusion centers. The present study was conducted to evaluate the distribution of blood groups in student as well as general population of different categories of Gujranwala Punjab Pakistan.

**Material method** Study was conducted by retrospectively examining voluntary donor data sets between from January 2018 and December 2018. ABO and Rh Blood groups obtained by tube agglutination & slide agglutination methods ABO and Rh typing was done by antigen antibody agglutination test by commercially available standard anti-sera i.e. anti A, anti B and Anti D after validation at blood bank.

**Results** Study duration is only one year this study is conducted at Sundas foundation blood bank and hematological center Gujranwala. ABO and Rh blood groups are studied, which are O, A, B, AB, the frequency for these blood groups are, respectively. O (30%), A (24%), B (35%) and AB (11%). Under Rhesus (Rh) system in which Rh -ve are (6%) and Rh + ve are (94%).

**Conclusion** The study has a significant implication regarding the management of blood bank and transfusion services in this area. Knowledge of blood group distribution is also important for clinical studies. Besides, these studies will help a lot in reducing the maternal mortality rate, as access to safe and sufficient supply of blood will help significantly in reducing the preventable deaths. Such studies need to be carried out at all the regional level of Pakistan.

From this we concluded that the highest frequency is noted in blood group B and lowest frequency is noted in blood group AB. The totals Number of male and female donor are 2603 in which

The female donors are 291. The total % of Rh+ve 94% and Rh -ve is 6%. Knowledge of the blood group distribution is also important for clinical trials to be reliable geographical information and forensic studies in the population. Such studies must be carried out on all regional levels of Pakistan.

**Key words;** Frequency of ABO blood groups, rhesus.

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## INTRODUCTION:

**Background** The first name of the settlement according to the compilers of the first edition of the district Gazette was Kanpur Shansi after an individual of the JAT cast called Khan Shansi who founded 11 villages in the nearby area. For some reason the Jaat Tribe Gujar occupied the land. They reach such dominance that the town came to be known as Gujranwala. It seems likely that the district once contained the capital of the Punjab, at an epoch when Lahore had not begun to exist. We learn from the Chinese Buddhist pilgrim, Hsuan Tsang, that about the year 630 he visited a town known as Tsekia (or Taki), the metropolis of the whole country of the five rivers. A mound near the modern village of Asarur has been identified as the site of the ancient capital. Until the Mahomedan invasions little is known of Gujranwala, except that Taki had fallen into oblivion and Lahore had become the chief city. 'Under Mahomedan rule the district flourished for a time; but a mysterious depopulation fell upon the tract, and the whole region seems to have been almost entirely abandoned. The Compilers of the district Gazetteer Gujranwala date this name to Approximately 300 years, giving us a rough estimate of the middle of the 16th century Founded in the 18th century, **Gujranwala** is a relatively modern town compared to the many nearby millennia-old cities of northern **Punjab**. The city served as the capital of the Sukerchakia Misl state between 1763 and 1799, and is the birthplace of the founder of the Sikh Empire, Maharaja Ranjit Singh.

Also known as the "City of Wrestlers" (Palwana da shehr in Punjabi) is an industrial city in Gujranwala District, Punjab province of Pakistan. It is the seventh-most-populous Pakistani metropolitan areas ABO blood group was discovered by Karl Landsteiner during early experiments with blood transfusion in 1901, for which he received the Nobel Prize 30 years later, and in cooperation with Alexander S Wiener, the rhesus (Rh) group was discovered in 1937[1].

Even after 100 years, the single most important test performed in blood banking services is determination of ABO blood groups to avoid morbidity and mortality [2].

Blood classification into groups is based on the presence or absence of inherited antigenic substances on the surface of red blood cells (RBCs). Some of these antigens are also present on the surface of other types of cells and body secretions like saliva, sweat, semen, serum, tears, urine etc [3]. Which are used in forensic investigations several of these RBC surface

antigens that stem from one allele (or very closely linked genes) collectively form a blood group system. Blood groups are genetically determined and exhibit polymorphism in different populations.

The main purpose of blood centers is the provision appropriate blood components that the patient needs by preparing certain blood components. Therefore, the blood group is at the top among the routine work of blood centers. However, the blood group studies were conducted started much earlier; ABO blood groups were first recognized in 1901 and Rh (rhesus). Blood group system in 1940. Thereafter, the number of recognized blood group systems increased reached today 23rd ABO and Rh systems Locate antigens that are transmitted through inheritance each on the ninth and first chromosomes [4].

ABO system is the main blood type in Transfusion medicine and the Rh system occupy the second area. The other blood group systems are very rarely a clinical problem. Therefore, in Routine practice is paid to ABO and Rh Systems as a compatibility test in blood centers; and only in case of problems, the other blood groups are there examined [4,5] The distribution of ABO and Rh blood groups may vary among nations and races [4].

The ABO blood group system was the first human blood group system that Landsteiner discovered in 1900. The ABO blood group system is the only system in which antibodies are consistently and predictably present in the serum of normal individuals whose red blood cells contain no antigens [5].

There are only two Rh-D phenotypes, such as Rh-D positive and Rh-D negative, depending on whether Rh-D antigen is present on the red cell or not. The incidence of ABO and Rh-D phenotypes in different populations has been extensively studied. It has been shown that different types of blood are also associated with various diseases. The Rh system developed as the second most important blood group system due to neonatal hemolytic disease and its importance for Rh D-negative individuals in subsequent transfusions.[6]The D antigen is the most important erythrocyte antigen in transfusion practice after A and B. In contrast to A and B, people whose red blood cells do not have the D antigen regularly have no D in the serum. In the blood bank, there is usually a problem that the stock position is constantly changing, and it is very difficult to predict the frequency of a particular blood group at a particular time. The present study was conducted to evaluate the distribution of blood groups in student as well as

general population of different categories of Gujranwala Punjab Pakistan. Study duration is only five year this study is conducted at Sundas foundation Gujranwala.

Sundas foundation is one of largest network of blood collection as well as in blood transfusion services for thalassaemia hemophilia and blood cancer in Punjab Pakistan.

The study of the ABO group system has been of immense interest due to its medical importance in various diseases. The ABO blood group system is not only important for blood transfusions, leukemia, blood cancer cardiovascular diseases, organ transplants and erythroblastosis in newborns [6].

### MATERIAL METHODS:

This study was conducted by retrospectively examining voluntary donor data sets between from January 2018 and December 2018. ABO and Rh Blood groups obtained by Tube agglutination & slide agglutination methods from a total **2603** individuals whose mean age was (range 18-55) Years) were proportionately taken into account female and male gender. After blood donation.

**Subjects:** Out of 2603 male and 291 were female subjects screened for their blood groups consent forms are taken from each blood donor for their blood grouping.

**Statistical Analysis:** Frequency percentage and proportions for each variable were calculated and 95% confidence interval (CI) was taken to define normal range.

### Collection of blood samples

A 2.0 ml sample of blood was drawn from the anti-cubital vein of each subject in a disposable syringe, and transferred immediately to a tube containing ethylene diamine tetra acetic acid (EDTA).

### Determination of blood groups

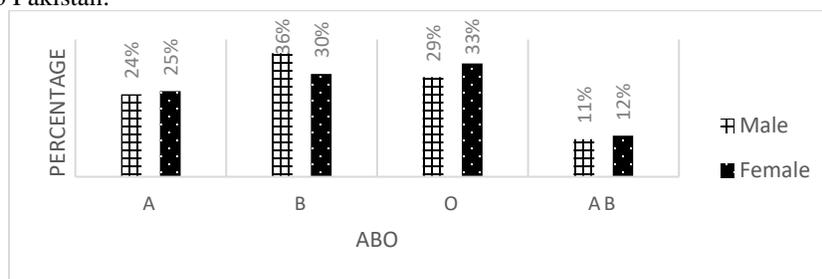
Blood grouping was done by the antigen antibody agglutination test. The anti sera used were obtained from Plasmatic (Kent, UK). Plasmatic ABO monoclonal reagents are in vitro culture supernatants of hybridized immunoglobulin secreting mouse celline. For determination of Rh factor, plasmatic anti D (1.0g) Lo-Du and LO-Du2 monoclonal reagents, prepared from different antibody producing human B-lymphocyte cell lines, were used.

### RESULTS:

**Table 1 shows the prevalence of ABO blood groups among blood donors in different Regions of Pakistan.**

	A	B	O	AB	RH+	RH-	Source
<b>Punjab(21)</b>	22.4	32.4	30.5	8.4	93.0	7.0	Sidhu S 2003
<b>Peshawar(20)</b>	28.00	34.00	31.00	7.00	94.60	5.40	Alam S 2006
<b>Bannu(18)</b>	31.03	36.23	25.07	7.67	89.27	10.73	Khan et al. (2004)
<b>Sindh(17)</b>	25.00	30.00	36.00	9.00	91.80	8.20	Bhatti & Sheikh (1999)
<b>Baluchistan(19)</b>	21.12	34.32	37.07	7.59	94.75	5.25	Hussain A 2001
<b>Skardu (16)</b>	30.62	26.80	26.60	15.98	94.83	5.17	Alam(2005)
<b>Present Study</b>	24.01	34.97	29.93	11.12	94.01	5.99	

**Gender Distribution** Figure 1 shows the prevalence of ABO blood groups among genders in blood donors Gujranwala Punjab Pakistan.



**Figure 1: ABO blood groups distributions among genders.**

ABO blood group d The ABO and Rh blood group systems are the commonly used grouping systems in the blood Transfusion. These systems also play an important role in transplantation, hereditary diseases, genetics and determination of migration of races. The association of different blood types with diseases is important because some blood types are particularly vulnerable develop certain diseases. The frequency of ABO and Rh blood type varies in different populations in the whole world. There are studies out Pakistan describes the frequency and prevalence of ABO and Rh blood groups in different regions.(Breuninger,van G4).

Frequency of ABO Blood group system in different population of world.

Population	A	B	AB	O	Source
Pakistan(12)	21.15	40.76	7.56	30.5	M Anees 2007
India(23)	22.88	32.26	7.74	37.12	Basu D 2018
Bangladesh(22)	25.4	31.1	9.7	33.8	Boyd WC 1949
SaudiArabia (14)	23.16	20.13	3.47	53.2	TALIB ZA 1998
Kenya (13)	26.2	22	4.4	47.48	Lyko J 1992
Hungary(15)	27.66	12.18	4.23	55.53	Tauszik T 1995
Kashmir (08)	22.95	32.05	38.43	6.55	A Agrawal 2014

### DISCUSSION:

The blood group distribution is examined in detail in the whole world. These studies clearly show Variations in the ABO and Rh distributions. The reason for this Diversity can include genetic drift; migration, alleles Selection and random effects Blood groups and Rh antigen are hereditary. Gene for ABO antigens is on the 9th chromosome and Rh antigen gene is on the 1st chromosome [24].

The study of distribution of blood groups is important as it plays a vital role in blood transfusion, organ transplantation, genetics research, human evolution, forensic pathology and some groups have shown associations with diseases like duodenal ulcer, diabetes mellitus, urinary tract infection and Rh and ABO incompatibilities of newborn[24]. This study has determined the distribution of ABO and Rh blood groups in Gujranwala region in both genders. Blood group of donors was not included to avoid a possible bias, as blood group B is regarded, in our country and some other countries, as a generous and more precious blood group encouraging more donations [23]. the blood donation system in Pakistan differs from many other countries in that the family and relatives of the recipient are responsible to insure blood units of the same recipients' blood group available for transfusion, with its consequences in amplification of the number of donations of high incidence blood groups like group B, O, A, and Rh positive and low incidence of donation of less frequent blood groups like AB, and Rh negative, which falsely decrease its incidence more. There were no significant differences in both ABO and Rh blood groups in men and women. This is because blood groups are of autosomal inheritance, thus, the frequencies are not different in both sexes, and, therefore, in blood group studies from all

populations, blood groups are reported for men and women together [16].

This study, we can conclude that this is the largest and most reliable data of ABO and Rh phenotype frequencies in Gujranwala region. It is close to the mean of the world's population, with similar trending to neighboring Indians, and most Europeans [11]. The frequency of ABO and Rh phenotypes in Gujranwala appears to be intermediate between eastern (Asian) and western (Caucasian) data [11].

ABO and Rh blood groups are studied, which are O, A, B, AB, the frequency for these blood groups are, respectively. O (30%), A (24%), B (35%) and AB (11%).Under Rhesus (Rh) system in which Rh –ve are (6%) and Rh + ve are (94%).

The study has a significant implication regarding the management of blood bank and transfusion services in this area. Knowledge of blood group distribution is also important for clinical studies, for reliable geographical information and for forensic studies in the population. Besides, these studies will help a lot in reducing the maternal mortality rate, as access to safe and sufficient supply of blood will help significantly in reducing the preventable deaths [8]. Such studies need to be carried out at all the regional levels of Punjab Pakistan.

### CONCLUSION:

We have observed that the most common blood type was **O (30%), A (24%), B (35%) and AB (11%) Under Rhesus (Rh) system in which Rh –ve are (6%) and Rh + ve are (94%)**. The study has a significant impact on the Management of blood banks and transfusion services in this area. Knowledge of the blood group distribution is also important for

clinical trials to be reliable geographical information and forensic studies in the population. Such studies must be carried out on all regional levels of Pakistan.

#### Ethical approval statement:

The ethical review board of Sundas foundation reviews data and approved for publication (conduct the project strictly in accordance with the proposal submitted and granted ethics approval including any amendment made to the proposal required by the ethics committee).

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