

ORIGINAL ARTICLE

ASSOCIATION OF GENDER WITH ABO AND RH BLOOD GROUPS —A CROSS-SECTIONAL STUDY

Sana Qanber Abbasi, Rabia Sattar, Ghazal Mansoor

Department of Physiology, Sharif Medical and Dental College, Lahore, Pakistan

Background: Blood is frequently transfused in medical practice. Among 400 identified red cell antigens, the most important are A, B and D antigens determining the ABO and Rh blood groups. Both blood groups are inherited in Mendelian fashion and are important from transfusion point of view. The objective of this study was to find out prevalence of ABO and Rh blood groups among medical and dental students of Sharif Medical and Dental College, Lahore. **Methods:** It was a cross-sectional study conducted in the department of Physiology, Sharif Medical and Dental College Lahore from Sep 2015 to Sep 2017. The students of MBBS and BDS from first year to final year, aged 18–24 years were included in the study. Conventional glass slide method was used to determine the ABO and Rh blood groups. Results were tabulated as frequency and percentage. **Results:** A total of 514 students were included in the study. Out of 514 students, 186 (36.18%) were males and 328 (63.18%) were females. Out of the males 170 (91.4%), and out of females 301 (91.8%) were Rh positive. The prevalence of Rh negative group in male subjects was 8.6%, and in female subjects it was 8.2%. The frequencies of A, B, O and AB blood groups in Rh positive male subjects were 23.66%, 31.18%, 29.03% and 7.53% respectively, and among females Rh positive subjects 19.82%, 39.63%, 21.34% and 10.98% respectively. In Rh negative male subjects the frequencies of A, B, O and AB blood groups were 1.08%, 3.76%, 2.15% and 1.61% respectively, and among female Rh negative subjects 1.22%, 2.74%, 3.35% and 0.91% respectively. **Conclusion:** The most prevalent blood group was B+ and no association was seen between gender and blood groups either ABO or Rh ($p>0.05$).

Keywords: Blood group, ABO group, Rh group, gender, prevalence, transfusion, mismatched

Pak J Physiol 2018;14(3):25–7

INTRODUCTION

Blood, the major fluid flowing through human bodies has always been a source of intrigue and fascination for people. It has been historically used for bathing, drinking and in artistic themes. Most importantly it is transfused to support life of patients in need.¹ ABO is the main blood grouping system in humans. It is characterized by the presence or absence of two main genes, A and B.² The major blood groups found in ABO system are A, B, AB and O. A and B antigens are found on the surface of red blood cells which constitute the major cell line in blood. These antigens are complex oligosaccharides and they differ because of the difference in their terminal sugars.³ Almost 400 antigens have been found on erythrocytes all of which are inherited by Mendelian trait.⁴ Rhesus (Rh) system is the second system of blood grouping. Rh blood grouping is of great importance in transfusion. It has only two Rh phenotypes namely Rh positive (Rh+) and Rh negative (Rh-) depending on the presence or absence of Rh antigen on the surface of red blood cells.^{5,6} Apart from ABO and Rh systems of blood groups, other important antigens out of 400 known antigens are Duffy, Diego, Kidd, Lutheran etc.⁶

The blood groups are inherited. ABO blood types are controlled by a single gene located on chromosome 9 having three alleles. Inheritance of Rh blood grouping is based on the presence of either R or r

alleles.⁷ All human races share the same blood grouping systems with significant differences in frequencies of different types. There is need to understand the prevalence and frequency of these blood groups among different populations and races. A marked variation has been observed in the incidence of ABO and Rh blood groups among Pakistani population indicating racial differences as well as genetic and ethnic diversity of human population.^{8–10}

The objective of this study was to make the gender based comparison of frequency of ABO and Rh blood groups among the medical and dental students of Sharif Medical and Dental College, Lahore.

MATERIAL AND METHODS

This cross-sectional analytical study was conducted in the Department of Physiology, Sharif Medical and Dental College Lahore from Sep 2015 to Sep 2017 after taking due permission from Ethical Review Committee of the College. Sample size was calculated using WHO sample size calculator. We included 514 students of MBBS and BDS from first year to final year of age 18–24 years. An informed written consent was taken.

Conventional glass slide method was used to determine the ABO blood groups in the Physiology laboratory during the practical. A sterile lancet was used to prick the finger. A drop each of anti-sera A, anti-sera B and anti-sera D were placed on the glass slides. A

drop of blood from individual student was mixed with anti-sera separately with the help of common pins. Blood groups were determined after observing agglutination with the naked eye. The agglutination in individual glass slides was confirmed after observing under the compound light microscope.

Data were analyzed using SPSS-25. Frequency and percentage were calculated for categorical variables. Association of blood groups with gender was calculated using Chi Square test. Alpha error was kept ≤ 0.05 .

RESULTS

This study included 514 medical and dental students out of which 186 (36.2%) were males and 328 (63.8%) were females. Their mean age was 20.01 ± 1.19 years. Table-1 shows frequency distribution of ABO and Rh blood groups in all participants.

Table-1: Frequency distribution of ABO and Rh blood groups in study population

Blood groups		Frequency	Percent
ABO	A	115	22.37
	B	204	39.69
	AB	56	10.89
	O	139	27.04
Rh	Positive	471	91.6
	Negative	43	8.4

Table-2 shows association of gender with ABO blood grouping, and Table-3 shows the association of gender with Rh grouping. Table-4 shows association of the gender with ABO and Rh blood grouping combined.

Table-2: Frequency of ABO blood groups in males and females [n (%)]

Gender	ABO Grouping				p
	A	B	AB	O	
Male	46 (24.73)	65 (34.95)	17 (9.14)	58 (31.18)	0.17
Female	69 (21.04)	139 (42.38)	39 (11.89)	81 (24.70)	

Table-3: Frequency of Rh blood groups in males and females [n (%)]

Gender	Rh Grouping		p
	Positive	Negative	
Male	170 (91.40)	16 (8.6)	0.88
Female	301 (91.77)	27 (8.2)	

Table-4: Frequency of ABO and Rh blood groups combined in males and females [n (%)]

Blood groups	Male	Female
A Positive	44 (23.66)	65 (19.82)
A Negative	2 (1.08)	4 (1.22)
B Positive	58 (31.18)	130 (39.63)
B Negative	7 (3.76)	9 (2.74)
AB Positive	14 (7.53)	36 (10.98)
AB Negative	3 (1.61)	3 (0.91)
O Positive	54 (29.03)	70 (21.34)
O Negative	4 (2.15)	11 (3.35)
p	0.25	

DISCUSSION

The most prevalent blood group was found to be B+ irrespective of gender. Also, no gender based association was found with blood groups either ABO or Rh ($p > 0.05$).

In our study the frequency distribution of blood group B was highest with percentage frequency of 39.6%, followed by blood group A, 22.37; blood group O, 27.04% and the least percentage frequency was of blood group AB 10.89%. Our study also confirmed that percentage frequency of Rh+ is the highest (91.6%) as compared to Rh- (8.4%). These results are quite similar to those found in a study by Hemalatha¹¹.

In our study, frequency comparison of different ABO blood groups between males and females showed the highest frequency percentage of B in males and females, 34.95% and 42.38% respectively. It was followed by blood group O, 31.18% in males and 24.70% in females; blood group A, 24.73% in males and 21.04% in females and the least frequency percentage was shown by blood group AB, 9.14% in males and 11.89% in females. So our study showed that the most prevalent ABO blood group in both males and females was B and no gender based association of ABO blood grouping system could be established ($p = 0.17$).

This study also compared frequency of Rh blood groups on the basis of gender. Again there was no gender based association. In males frequency percentage of Rh+ was 91.04% and in females 91.77%. The frequency percentage of Rh- was more in males (8.6%) as compared to females 8.2%. However overall frequency of Rh+ was almost equal in both the genders ($p = 0.88$).

Our study also compared both ABO and Rh blood groups in male and female medical and dental students. The highest frequency percentage in both males and females was of blood group B+ (31.18%) in males and 39.63% in females, showing a little higher percentage in females compared to males. The least frequency percentage was of A-, 1.08% in males and 1.22% in females. However no significant difference could be established in the distribution of ABO and Rh blood groups among male and female medical students ($p = 0.25$).

Taking into consideration that the medical students and medical health professionals deal directly with the emergencies requiring urgent blood donations, awareness regarding their own blood groups is helpful. Blood groups are of vital importance in various aspects especially blood transfusion, genetic research, human evolution and forensic investigations⁸, inheritance patterns, paternity, finger printing and as predictor of national suicide rates.¹²⁻¹⁴

ABO blood grouping is clinically most significant because of the potential ability of this

system's antibodies to cause haemolytic transfusion reactions and haemolytic disease of the foetus and newborn.¹⁵ We tried to find out any gender difference in the distribution of ABO and Rh blood groups. However no significant correlation could be found among both genders. These results are in accordance with the previous studies by Odokuma *et al*¹⁶ and Kanwal *et al*¹⁷. There is, however, one study conducted by Saghir Ahmad in Rahim Yar Khan in which the frequency distribution of O+ was the highest among the females.⁴

According to some previous studies in Pakistan the prevalence of blood groups was seen to be in the order O>B>A>AB.^{3,8} Our study shows the prevalence order as B>O>A>AB. Similar results were reported by Khan MU *et al*¹⁸. Also, same patterns of blood group distribution have been reported by many past studies conducted at various regions of Punjab and Khyber Pakhtunkhwa.^{14,17,19} In contrast, the most prevalent blood group in Sindh and Baluchistan¹⁷ was O and blood group A in Northern Areas of Pakistan.²⁰

In our study Rh- groups were more common among females than males, again supporting the previous studies⁸. In a study²¹ conducted at Shaikh Khalifa Bin Zayed Al-Nahyan Medical and Dental College, Lahore, most prevalent blood group was found to be B+ and the least common was AB-. Our study supports their results.

LIMITATIONS

The data was collected from only one institution. Data from other institutions can further strengthen the results of this study.

CONCLUSION

No statistically significant association was found between gender and ABO and Rh blood groups. The most prevalent blood group was B+ which is in accordance with the overall trend of ABO frequencies in different regions of Pakistan.

REFERENCES

- Ghori MR, Tayyab M, Raziq F. Frequency of ABO and Rh D blood groups in transfusion dependent patients. *J Postgrad Med Inst* 2003;17(2):177-83.
- Javed M, Akhtar MN, Muzaffar S. Frequency of ABO and Rh blood groups in patients with diabetes mellitus. *Pak J Med Health Sci* 2017;11(1):114-6.

- Pasha AK, Hashir MM, Khawar S. Frequency of ABO blood groups among medical students. *J Surg Pak* 2009;14(2):93-5.
- Ahmad S. Prevalence frequency of ABO and Rhesus blood groups in human in district Rahim Yar Khan, Pakistan. *Am J Biosci* 2015;3(4):141-4.
- Chandra T, Gupta A. Prevalence of ABO and Rhesus blood groups in northern India. *J Blood Disord Transfus* 2012;3(5):132.
- Anwar B, Kaleem F, Moazzam A, Rizvi SR, Karamat KA. Distribution of blood groups in population of Lehrar Road Islamabad. *J Islamabad Med Dent Coll* 2013;2(1):13-6.
- Shaheen S, Nouroz F, Mujtaba G, Noreen S, Farooq M. A study on seroprevalence of ABO blood groups in Lahore, Pakistan. *J Rashid Latif Med Coll* 2014;3(2):24-7.
- Hemalatha NR, Bhagya V. Frequency and distribution of blood groups among medical students in Davanagere. *J Pub Health Med Res* 2015;3(1):1-4.
- Khattak ID, Khan TM, Khan P, Shah SM, Khattak ST, Ali A. Frequency of ABO and Rhesus blood groups in District Swat, Pakistan. *J Ayub Med Coll Abbottabad* 2008;20(4):127-9.
- Ilyas M, Ifikhar M, Rasheed U. Frequency of ABO and Rh blood groups in Gujranwala (Punjab), Pakistan. *Biologia (Pakistan)* 2013;59(1):107-14.
- Hemalatha NR. ABO and Rh blood group distribution among medical students in Mandya. *Int J Contemp Med Res* 2017;4(8):1655-8.
- Jawed S, Zia S, Tariq S. Frequency of different blood groups and its association with BMI and blood pressure among the female students of Faisalabad. *Pak J Med Assoc* 2017;67(8):1132-7.
- Tesfaye K, Petros Y, Andargie M. Frequency distribution of ABO and Rh (D) blood group alleles in Silte Zone, Ethiopia. *Egypt J Med Human Gen* 2015;16(1):71-6.
- Pasha AK, Hashir MM, Khawar S. Frequency of ABO blood groups among medical students. *J Surg Pak* 2009;14(2):93-5.
- Erahbor O, Isaac IZ, Saidu A, Ahmed HM, Abdulrahman Y, Festus A, *et al*. The distribution of ABO and rhesus blood groups among residents of Gusau, Zamfara State, North Western Nigeria. *Res Rev J Med Health Sci* 2013;2(4):58-63.
- Odokuma EI, Okolo AC, Aloamaka PC. Distribution of ABO and Rh blood groups in Abraka Delta State. *Niger J Physiol Sci* 2007;22(1-2):89-91.
- Kanwal S, Qureshi HJ, Aslam MS, Masood S. Frequency of ABO and Rh blood groups in students of Akhtar Saeed Medical and Dental College, Lahore. *Pak J Physiol* 2016;12(1):29-30.
- Khan MU, Bashir MW, Rehman R, Kiani RA. Frequency of ABO and Rh (D) blood groups among blood donors in Lahore, Pakistan. *Inter J Adv Biol Biomed Res* 2014;29:597-600.
- Alamgeer, Noor N, Khan H, Akram S. Study about health consciousness and awareness of blood groups in the selected population of University of Sargodha. *Pharmacology Online (Newsletter)* 2011;2:1119-25.
- Alam M. ABO and Rhesus blood groups in potential blood donors at Skardu (Northern Areas). *Pak J Pathol* 2005;16:947.
- Butt DS, Malik S, Khalid MZ, Aziz M, Humayun A. Gender distribution of ABO and Rhesus blood groups among medical students of a public medical school in Lahore, Pakistan. *Proceeding Shaikh Zayed Postgrad Med Comp* 2016;30(2):77-81.

Address for Correspondence:

Dr Sana Qanber Abbasi, Assistant Professor, Department of Physiology, Sharif Medical and Dental College, Lahore, Pakistan. **Cell:** +92-331-4241476

Email: sanaqanberabbasi@gmail.com

Received: 21 Nov 2017

Reviewed: 28 May 2018

Accepted: 3 June 2018