

ORIGINAL RESEARCH ARTICLE

SPECTRUM OF ABO AND RH BLOOD GROUP IN NEPALI MEDICAL STUDENTS

Bishal Joshi¹, Sanjit Kumar Kar^{1,*}, Laxmi Shrestha², Shankar Yadav¹

¹Department of Physiology, Universal College of Medical Sciences Bhairahawa, Nepal.

²Department of Pharmacology, Universal College of Medical Sciences Bhairahawa, Nepal.

Received: 25 Apr, 2020

Accepted: 1 Jun, 2020

Published: 25 Jun, 2020

Key words: ABO; Blood group; Medical students; Rh factor.

**Correspondence to: Sanjit Kumar Kar, Department of Physiology, Universal College of Medical Sciences, Bhairahawa, Nepal.
Email: drkarsk@gmail.com*

DOI: <https://doi.org/10.3126/jcmc.v10i2.29676>

Citation

Joshi B, Kar SK, Shrestha L, Yadav S. Spectrum of ABO and Rh blood group in Nepali medical students. Journal of Chitwan Medical College. 2020;10(32):63-66.



Peer Reviewed

ABSTRACT

Background: ABO and Rh systems are most important types of blood group systems that should be taken into consideration during blood transfusion. Many studies have been done across the globe to determine the distribution of these blood groups among different strata of population. But there are very few studies done in Nepali population. Therefore, in this study we aimed to find out the distribution of blood groups among Nepali medical students and to compare it with the other studies done in Nepal and other countries of the World.

Methods: This was a retrospective study, containing the data of ABO and Rh blood groups of medical students recorded over a period of 21 years in Department of Physiology of Universal College of Medical Sciences, Bhairahawa, Nepal. The blood group was determined by open slide test method by using commercially available standard monoclonal antibody.

Results: A total of 2031 Nepali medical students were included in the study. Among them 1147 were male and 884 were female. In the present study we found that the most common blood group was O (739, 36.4%) followed by B (624, 30.7%) and A (522, 25.7%) and least common blood group was AB (146, 7.2%). Among all participants 96.8% of the people were Rh positive and 3.2% were Rh negative.

Conclusions: This study done in Nepali medical students can provide a new insight for the further study of distribution of blood groups in Nepali population. A study with high sample size, representing every zones of Nepal is the demand of future.

INTRODUCTION

Blood groups were first discovered by Austrian scientist Carl Landsteiner in 1901 AD. He observed two types of antigens: antigen A and antigen B, present on the membrane of RBC.¹ After forty years, in 1941 AD, Landsteiner and Weiner discovered D antigen on the surface of RBC of Rhesus monkey.² On the basis of presence and absence of these antigens on the surface of RBC, ABO blood grouping system is divided in four types A, B, AB and O and Rh blood grouping system into Rh positive and Rh negative types.³

Blood groups are important in compatibility test during blood transfusion, genetic studies of population, resolving paternity dispute, correlating their relation to disease in modern medicine as well as studying human ancestral relationships⁴. Many studies have shown the association of ABO blood groups with different types of diseases like skin cancer, gastric cancer, pancreatic cancer, ovarian cancer, ischemic heart disease and diabetes mellitus.⁵ Knowledge of distribution of blood group is again very essential for effective management of blood banks.⁶

A number of researches have been done throughout the world to determine the prevalence of different types of blood groups but very few studies are done in Nepal. So, in this study we

have attempted to determine the distribution of blood groups in medical students and to compare our results with other studies done in Nepal and elsewhere in the world. It is also important in medical students as they can be the emergency blood donors in acute crisis of particular group of blood in hospital blood banks.

METHODS

This retrospective study was conducted in Department of Physiology of Universal College of Medical Sciences (UCMS), Bhairahawa, Nepal. The research work was started after getting the ethical clearance from institutional review committee (UCMS/IRC/224/19). The experiment on determination of own blood group is conducted every year in MBBS, BDS, Paramedical and Nursing students in hematology lab during practical sessions. This data containing blood groups of medical students was obtained from Department of Physiology for study purpose. In this research, we studied 21-years data i.e. from establishment of the Department in 1998 AD to November 2019 AD. All the Nepali medical students were included and the foreign students were excluded in the study. We used complete enumeration system, so a total of 2031 Nepali Medical students who had their blood grouping done in the department were

included in this study. This data was analyzed using SPSS version 16.

The technique that had been used for the determination of blood group in department of Physiology was open slide test method.⁷ In this method blood group was determined on the basis of agglutination reaction. First of all, RBC suspension was made by mixing blood with normal saline. Then two glass slides were taken and these slides were divided into four areas. In these four separate areas, one drop anti-A, anti-B and anti-D and normal saline was placed. Then RBC suspension was placed in each part with the help of dropper and mixed with separate stirrer. The blood clumping pattern or agglutination reaction was observed by naked eye and for confirmation the slide was observed under microscope and ABO blood group and Rh factor was determined.

RESULTS

A total of 2031 Nepali medical students were included in the study. Among them 1147 were male and 884 were female. In the present study, we found that the most common blood group was O (739, 36.4%) followed by B (624, 30.7%) and A (522, 25.7%) and least common blood group was AB (146, 7.2%) (Table 1).

Table 1: Distribution of ABO blood group according to gender

Gender	Blood Group				Total
	A	B	AB	O	
Male	246 (21.4%)	353 (30.8%)	92 (8.0%)	456 (39.8%)	1147 (100%)
Female	276 (31.2%)	271 (30.7%)	54 (6.1%)	283 (32.0%)	884 (100%)
Total	522 (25.7%)	624 (30.7%)	146 (7.2%)	939 (36.4%)	2031 (100%)

In case of male, it was again observed that the most common blood group was O followed by B, A and AB. But in case of female, we found that the most common blood group was O followed by A and B and least common blood group was AB. Among all participants 96.8% of the people were Rh positive and 3.2% were Rh negative (Table 2).

Table 2: : Distribution of Rh blood group according to gender

Gender	Rh-Positive	Rh-Negative	Total
Male	1100 (95.9%)	47 (4.1%)	1147 (100%)
Female	865 (97.9%)	19 (2.1%)	884 (100%)
Total	1965 (96.8%)	66 (3.2%)	2031 (100%)

In case of male, 95.9% were Rh positive and 4.1% were Rh negative whereas in case of female 97.9% were Rh positive and only 2.1% were Rh negative (Table 2). Among all types of blood groups, O positive (709, 34.9%) was most prevalent and AB negative (6,0.3%) was least prevalent type of blood group (Table 3).

Table 3: Distribution Rh Factor in A, B, AB and O blood groups

Blood group	A	B	AB	O	Total
Rh Positive	506 (96.9%)	610 (97.8%)	140 (95.9%)	709 (95.9%)	1965 (96.8%)
Rh Negative	16 (3.1%)	14 (2.2%)	6 (4.1%)	30 (4.1%)	66 (3.2%)

DISCUSSION

The study of distribution of blood group is very crucial as it has important role during blood transfusion, organ transplantation and genetic research.⁴ A number of studies have also shown the association between blood groups and susceptibility of several diseases.⁵ Several studies on distribution of blood groups, done across the different geographical areas of the World have shown varied spectrum of distribution of ABO and Rh pattern. In present research, we have studied the distribution of ABO and Rh blood group in 2031 Nepali medical students of Universal College of Medical Sciences, Bhairahawa. As every year students join UCMS from almost all the zones of the country, this data represents the overall distribution of blood group of the people all over the Nepal.

In present study we have found that the sequence of distribution of ABO blood group is O>B>A>AB. We compared the results of the present study with other studies done in Nepal and other areas of the World (Table 4). Similar type of study was done in Nepal by Upadhyay et al⁸ in students of five different medical colleges of Nepal in 2013 AD. The sequence of distribution of blood group in their study was O>B>A>AB which is quite consistent with the results of the present study. In another similar study in Kathmandu valley of Nepal, Pramanik et al⁹ found that the sequence of distribution of blood group was O>A> B >AB with Rh positive 99.2 % and Rh negative 0.8%. The differences in results in all these studies of same country may be due to the ethnic variation in population as Nepal is a country rich in ethnic diversity.

In a similar research Das PK et al¹⁰ in Vellore and Periyavan A et al¹¹ in Bangalore India found that the sequence of distribution of blood group was O>B>A>AB which is also in agreement with the present study. In other studies, different findings have been observed, like in Gujrat state of India¹², Bangladesh¹³, and Pakistan¹⁴ the researchers found that B blood group was most prevalent and the sequence of distribution was B>O>A>AB.

In other similar studies done in Ghana¹⁵, Uganda¹⁶, Saudi Arabia¹⁷, Tanzania¹⁸, Niger-Delta¹⁹ and Dinajpur district of Bangladesh²⁰ blood group O was found to be the most frequent and AB was found to be the least frequent which is also similar to the present study. However, in contrast to our study the sequence of distribution of blood group in their study was O>A>B>AB. In another study done in Peshawar Pakistan²¹ the sequence of distribution was B>A>O>AB. The variation in findings in studies

Table 4: Comparison of distribution of ABO and Rh blood group between present study and other studies

Study done	A	B	AB	O	Rh Positive	Rh Negative
Present study	24.9	31.1	7.2	36.8	95.4	4.6
Nepal ⁸	34	29	4	32.5	96.7	3.3
Nepal ⁹	28.5	27.3	8.7	35.5	99.2	0.8
Vellore (India) ¹⁰	18.85	33.67	5.27	42.21	97.3	2.7
Bangalore (India) ¹¹	23.86	29.95	6.37	39.82	94.2	5.79
Gujarat (India) ¹²	23.3	35.5	8.8	32.4	94.2	5.8
Bangladesh ¹³	24.1	34.5	9.6	33	97.1	2.89
Pakistan ¹⁴	22.91	35.36	9.32	32.41	92.03	7.97
Ghana ¹⁵	24.3	20.7	5	50	93.8	6.2
Uganda ¹⁶	25	20.4	4.3	50.3	97.9	2.03
Saudi Arabia ¹⁷	33.4	6	3.8	56.8	92.8	7.2
Tanzania ¹⁸	26	19	3	52	98	2
Niger-Delta ¹⁹	23.8	20.7	2.8	52.7	93.9	6.12
Bangladesh ²⁰ (Dinajpur)	26.6	23.2	9.6	40.6	96.8	3.2
Pakistan ²¹ (Peshawar)	31.2	31.7	10.1	27	92.5	7.5
West Iran ²² (Khurdish)	37.22	17.86	7.75	37.15	91.1	8.9
Germany ²³	41	11	5	41	85	15

reported from different geographical areas of the world may be due to racial and ethnical variation among the population of different areas of the world.

In case of Rh blood grouping system, now it is well established fact that Rh positive blood group is much more prevalent than Rh negative blood group.⁸⁻²² In present study we found that 96.8% of people are Rh positive and 3.2% are Rh negative. Almost all of the studies done across the globe show that the prevalence of Rh positive blood group is more than 90% and Rh negative blood group is less than 10%.⁸⁻²² In one study done in Germany Pelzer U²³ found that 85% of people were Rh positive and 15% of people were Rh negative which actually shows the highest percentage of Rh negative group of people in comparison to other data. This also shows that in European population Rh negative blood group is more prevalent in comparison to Asian and African population.

CONCLUSION

In the present study we have observed the distribution pattern of blood group in Nepali students of Universal College of Medical Sciences, Bhairahawa, Nepal. The results from the present study conclude that, the most common blood group was O followed by B and A and least common blood group was AB. In case of Rh blood group 96.8% of the people were Rh

positive and 3.2% were Rh negative. As this is the data of 21 years of students who had studied this institute, from almost all the districts of Nepal, the result represents the overall pattern of distribution of blood group in Nepali population. Though the sample size of the study is small in regards to representing the overall population of Nepal, it still gives an estimate of percent distribution of blood group in Nepal and can be useful for the further studies on blood group. Very few studies have been done in Nepal on distribution of blood group and these studies even contain smaller sample size in comparison to the present study. So there is need of larger population based study in different zones of Nepal to find out the more accurate distribution pattern of blood group in Nepali population.

ACKNOWLEDGEMENTS

We would like to acknowledge all the members of Department of Physiology, UCMS for their cooperation and constant support during data collection. We would like to thank IRC committee of UCMS for allowing us to conduct this research work.

CONFLICT OF INTEREST: None

FINANCIAL DISCLOSURE: None

REFERENCES:

- Lefrère J, Berche P. Landsteiner discovers the blood groups. *Transfus Clin Biol.* 2010;17(1):1–8. [\[DOI\]](#)
- Garratty G, Dzik W, Issitt PD, Lublin DM, Reid ME, Zelinski T. Terminology for blood group antigens and genes-historical origins and guidelines in the new millennium. *Transfusion.* 2000;40:477–89. [\[DOI\]](#)
- Nishi K, Gupta NK and Sharma SC. Study on the Incidence of Hypertension and Migraine in ABO Blood Groups. *ISCA Journal of Biological Sciences* 2012;1(2):12-6. [\[DOI\]](#)
- Tesfaye K, Petros Y, Andargie M. Frequency distribution of ABO and Rh (D) blood group alleles in Silte Zone, Ethiopia. *Egyptian Journal of Medical Human Genetics.* 2015;16(1):71-6. [\[DOI\]](#)
- Golassa L, Tsegaye A, Erko B, Mamo H. High rhesus (Rh(D)) negative frequency and ethnic-group based ABO blood group distribution in Ethiopia. *BMC Research Notes.* 2017 Dec;10(1):330. [\[LINK\]](#)

6. Enosolease M, Bazuaye G. Distribution of ABO and Rh-D Blood group in the Benin area of Niger Delta: Implication for regional blood transfusion. *Asian J Transfus Sci.* 2008;2(1):3-5. [\[PMID\]](#)
7. Mujahid A, Dickert F. Blood group typing: From classical strategies to the application of synthetic antibodies generated by molecular imprinting. *Sensors.* 2016 Jan;16(1):1-17. [\[DOI\]](#)
8. Uphaday-Dhungel K, Banskota G, Das P and Sohal A. Distribution of ABO and Rh blood groups in Nepalese medical students. *Janaki Medical College Journal of Medical Science.* 2013;1(2):17-20. [\[DOI\]](#)
9. Pramanik T, Adhikari P. Trend of blood group distribution among the different ethnic groups of Kathmandu Valley. *Nepal Med Coll J.* 2006;8(4):248-9. [\[PMID\]](#)
10. Das PK, Nair SC, Harris VK, Rose D, Mammen JJ, Bose YN et al. Distribution of ABO and Rh-D blood groups among blood donors in a tertiary care centre in South India. *Trop Doct.* 2001;31(1):47-8. [\[DOI\]](#)
11. Periyavan A, Sangeetha SK, Marimuthu P, Manjunath BK, Seema. Distribution of ABO and Rhesus-D groups in and around Bangalore. *Asian J Transfus Sci.* 2010;4(1):41. [\[PMID\]](#)
12. Wadhwa MK, Patel SM, Kothari DC, Pandey M, Patel DD. Distribution of ABO and Rhesus-D groups in Gujarat, India: a hospital based study. *Indian J Ped Oncol.* 1998;19(4):137-4. [\[LINK\]](#)
13. Ahad MA, Bakar MA, Ahsan HAM. Pattern of ABO and Rhesus (Rh) blood group among blood donors. *TAJ.* 2002;15(2):68-70. [\[LINK\]](#)
14. Ilyas M, Iftikhar M, Rasheed U. Frequency of ABO and Rh Blood groups in Gujranwala (Punjab), Pakistan. *Biologia (Pakistan).* 2013;59(1):107-114. [\[LINK\]](#)
15. Doku GN, Agbozo WK, Annor RA, Kisseh GD, Owusu MA. Frequency of ABO/Rhesus (D) blood groupings and ethnic distribution in the Greater-Accra region of Ghana, towards effective blood bank inventory. *International journal of immunogenetics.* 2019;46(2):67-73. [\[DOI\]](#)
16. Apecu RO, Mulogo EM, Bagenda F, Byamungu A. ABO and Rhesus (D) blood group distribution among blood donors in rural south western Uganda: a retrospective study. *BMC research notes.* 2016 Dec 21;9(1):513. [\[DOI\]](#)
17. Sarhan MA, Saleh KA, Bin-Dajem SM. Distribution of ABO blood groups and rhesus factor in Southwest Saudi Arabia. *Saudi Med J.* 2009;30(1):116-119. [\[PMID\]](#)
18. Jahanpour O, Pyzuza JJ, Ntiyakunze EO, Mremi A, Shao ER. ABO and Rhesus blood group distribution and frequency among blood donors at Kili-manjaro Christian Medical Center, Moshi, Tanzania. *BMC research notes.* 2017 Dec;10(1):738. [\[LINK\]](#)
19. Enosolease ME, Bazuaye GN. Distribution of ABO and Rh-D blood groups in the Benin area of Niger-Delta: Implication for regional blood transfusion. *Asian J Transf Sci.* 2008; 2(1):3-5. [\[PMID\]](#)
20. Talukder SI, Das RK. Distribution of ABO and Rh blood groups among blood donors of Dinajpur district of Bangladesh. *Dijanpur Medical Col J.* 2010;3:55-8. [\[LINK\]](#)
21. Nazli R, Haider J, Khan MA, Akhtar T, Aslam H. Frequency of ABO blood groups and RhD factor in the female population of District Peshawar. *Pak J Med Sci.* 2015;31(4):984-86. [\[LINK\]](#)
22. Ghobadian Z Sayemiri K, Zeinali M, Sajjadi SM. Distribution of ABO and Rh blood groups in a major ethnic group of the West Iran, the Kurdish population. *Asian journal of medical sciences.* 2014;5(3):26-9. [\[DOI\]](#)
23. Pelzer U, Klein F, Bahra M, Sinn M, Dörken B, Neuhaus K et al. Blood group determinates incidence for pancreatic cancer in Germany. *Front Physiol.* 2013;24:118. [\[PMID\]](#)