

DISTRIBUTION OF BLOOD GROUPS IN MEDICAL STUDENTS: A COMPARATIVE STUDY

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ABSTRACT

INTRODUCTION

Blood groups depend on antigens present on the surface of red blood cells. Scientists have discovered at least 30 common antigens and hundreds of rare antigens causing antigen-antibody reaction in human red blood cells. These antigens are genetically determined and are developed in fetal life and remain unchanged till death. Many blood group systems are identified but ABO and Rh blood groups are more antigenic.

MATERIAL AND METHODS

In the present study, we observed ABO and Rh blood groups of 3057 students who studied in Universal College of Medical Sciences, Bhairahawa, Nepal from 1998 AD to 2019 AD, using open slide test method. The data was analyzed using SPSS version 20.

RESULTS

Results of the present study indicated that the most common blood group was O (36.8%) followed by blood group B (31.1%) and blood group A (24.9%) and least common blood group was AB (7.2%) i.e. O>B>A>AB. The same sequence of ABO blood grouping was seen in both male and female. Rh positive blood group was found in 95.4% and Rh negative blood group was found in 4.6% of population.

CONCLUSION

Knowledge of distribution of blood group is very important for medical students as they can serve as immediate blood donor in emergency conditions. This study can provide insight to advanced studies in future which can relate blood groups with medical conditions.

KEYWORDS ABO, Rh, Blood groups, Medical students

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INTRODUCTION

ABO and Rh system of blood groups are genetically determined antigens present on the membrane of RBC. Scientists have discovered more than 30 commonly occurring antigens and hundreds of rare antigens causing antigen-antibody reaction on the surface of human RBC. Most of the antigens are weak and are of very less clinical importance. Two particular groups of antigens ABO system and the Rh system are much more antigenic than the others to cause blood transfusion reactions.¹ The ABO blood group system was discovered by Carl Landsteiner in 1901 AD. Later Landsteiner and Wiener defined the Rh blood group in Rhesus monkey in 1941 AD.²

On the basis of presence and absence of these antigens ABO system is divided into four major groups called A, B, AB and O blood groups. Likewise when D antigen is present, blood group is Rh positive and when D antigen is absent, blood group is Rh negative.³ Distribution of blood groups is important as it has multiple applications in modern medicine, anthropology, genetic research and tracing ancestral relations of humans.⁴ The knowledge of distribution of different Blood groups at various levels is very essential for fulfilling its requirement in crucial conditions. So in this study we have attempted to find out distribution of blood groups in students of Universal College of Medical Sciences, Bhairahawa, Nepal.

MATERIAL AND METHODS

This study was carried out in Department of Physiology in Universal College of Medical Sciences, Bhairahawa, Nepal. The practical sessions on determination of blood group are conducted every year in Hematology laboratory of department of Physiology for second year MBBS and BDS and first year paramedical and nursing students as per the university syllabus. The data of blood groups of the students who studied in this institute from 1998 to 2019 AD was taken from record section of Physiology department. So this complete data includes blood groups of total 3057 MBBS, BDS, paramedical and nursing students who studied in this institute in a period of 21 years. We included only Nepali and Indian students in this study. Students from other countries apart from Nepal and India were excluded in this study.

The processing and analysis of data was done from July 2019 to September 2019, after taking approval from institutional review committee (UCMS/IRC/107/19). During the practical session open slide test method⁵ is used for determination of blood group. For this method, we used two glass slides. These slides were divided into four parts. In four areas, one drop anti-A, anti-B and anti-D and normal saline was placed separately. Subject's Blood was mixed with normal saline and RBC

suspension is prepared. A drop of RBC suspension was mixed in each part with the help was dropper. The agglutination or blood clumping pattern was observed by naked eye and for confirmation the slide was observed under microscope and ABO blood group and Rh factor was determined.

RESULTS

Table 1. Distribution of ABO blood group according to Gender

Sex	Blood Group				Total
	A	B	AB	O	
Male	380 (22.0%)	533 (30.9%)	130 (7.5%)	682 (39.5%)	1725 (100.0%)
Female	381 (28.6%)	418 (31.4%)	89 (6.7%)	444 (33.3%)	1332 (100.0%)
Total	761 (24.9%)	951 (31.1%)	219 (7.2%)	1126 (36.8%)	3057 (100.0%)

Table 2. Distribution of Rh blood group according to Gender

Sex	Rh-Positive	Rh-Negative	Total
Male	1634 (94.7%)	91 (5.3%)	1725 (100.0%)
Female	1282 (96.2%)	50 (3.8%)	1332 (100.0%)
Total	2916 (95.4%)	141 (4.6%)	3057 (100.0%)

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

Blood group	A	B	AB	O	Total
Rh positive	734 (96.5%)	911 (95.8%)	208 (95.0%)	1063 (94.4%)	2916 (95.4%)
Rh negative	27 (3.5%)	40 (4.2%)	11 (5.0%)	63 (5.6%)	141 (4.6%)
Total	761 (100%)	951 (100%)	219 (100%)	1126 (100%)	3057 (100.0%)

The data of total 3057 medical students was analyzed using SPSS version 20. Among 3057 students, 1725 were male and 1332 were female. The most common blood group found was O (1126, 36.8%) followed by blood group B (951, 31.1%) and blood group A (761, 24.9%) and least common blood group was AB (219, 7.2%) i.e. O>B>A>AB (Table 1). The same sequence of ABO blood grouping was seen in both male and female. Rh positive blood group was found in 95.4% and Rh

negative blood group was found in 4.6% of population (Table 2). Among the blood groups, group O had highest percentage of Rh negative i.e. 5.6% and A blood group had lowest percentage of Rh negative i.e. 3.5% (Table 3). In male students 94.7% were Rh positive and 5.3% were Rh negative. In female students 96.2% were Rh positive and 3.8% were found to be Rh negative.

DISCUSSION

Blood groups are based on the type of antigens present on the surface of red blood cells. The gene for ABO blood group antigen is present on the long arm of ninth chromosome and Rh antigen is on short arm of first chromosome.⁶ Investigation of blood grouping is very important in relation to different diseases and is of great importance in blood transfusion and organ transplantation.⁷

The objective of this study is to find out the distribution of ABO and Rh blood groups among the medical students of Universal College of Medical Sciences (UCMS) Bhairahawa. In this study blood group of total 3057 medical students who studied in UCMS from 1998 to 2019 was analyzed. Among the total participants 2031 participants were Nepali students whereas 1026 participants were Indian students. Among all participants 1725 (56.4%) were male and 1332 (43.6%) were female (Table 1). In present study we found that the most common blood group was O (1126, 36.8%) followed by blood groups B (951, 31.1%) and A (761, 24.9%) and least common blood group was AB (219, 7.2%) i.e. O>B>A>AB.

Many studies have been done on distribution of blood group in wide range of population across the globe. We screened for the articles in Pub Med central, Sun Direct and Google Scholar and by exclusion criteria (supplementary data 1), we found that a total of 49 articles have been published on distribution of blood group since 1964 to 2019 worldwide (Figure 1) which are similar to the present study. The aim of our study is to find out the frequency of ABO and Rh blood groups in medical students who represent population from Nepal and India. We compared the distribution of ABO and Rh blood group of present study with the similar studies done in other parts of the world (Table 4). Similar study was done by Pramanik et al⁸ in medical students of Kathmandu in 2000 AD.

The result of their study is slightly different from our study as the sequence of prevalence of blood group is A>O>B>AB. In another study done in Kathmandu valley, Pramanik et al⁹ found that O blood group was most prevalent followed by A, B and AB with Rh positive 99.2% and Rh negative 0.8%. The differences in result between these studies and the present study may be due to the ethnic variation in population.

In similar studies, Periyavan A et al¹⁰ in Bangalore and Das PK

et al¹¹ in Vellore India found the distribution of ABO blood groups in sequence of O>B>A>AB which is quite consistent with the present study. In other studies done in Dinajpur district of Bangladesh¹², Ghana¹³, Uganda¹⁴, Niger-Delta¹⁵, Tanzania¹⁶ and Saudi Arabia¹⁷ 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 similar studies conducted in Pakistan¹⁸, Khulna Medical College of Bangladesh¹⁹ and Gujarat state of India²⁰ blood group B was found to be the most prevalent blood group and the sequence of distribution was B>O>A>AB. The result of their studies was quite different from the present study. The discrepancies found between the present study and other studies can be due to the ethnic differences among the different population of the world.

In Rh blood group system, it is well established fact that Rh positive blood group is highly prevalent than Rh negative blood group. In present study 95.4% of the participants were Rh positive and 4.6% were found to be Rh negative.

In a similar study in Kathmandu, Pramanik et al⁹ found that 99.2% were Rh positive and only 0.8% percentage were Rh negative which actually shows the least prevalence of Rh negative blood group when compared to the other data from different areas of the World (Table 4). Whereas in a study conducted in Germany²¹, it was observed that 15% of the people were Rh negative which actually shows the highest percentage of Rh negative people in comparison to other data.

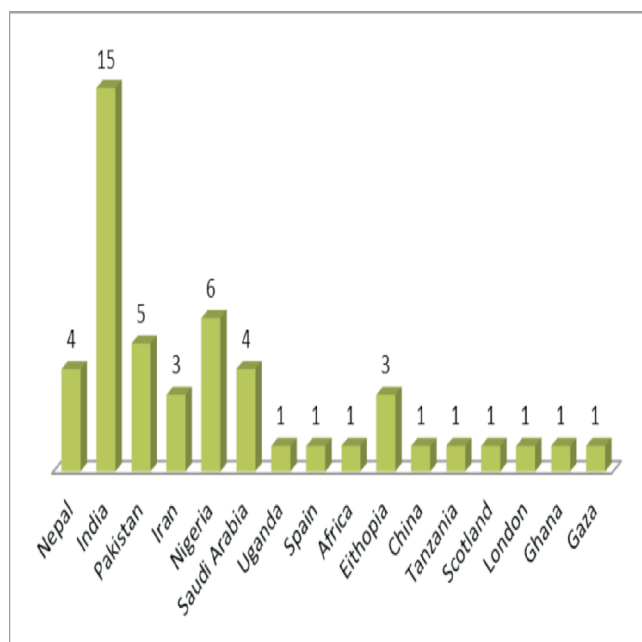
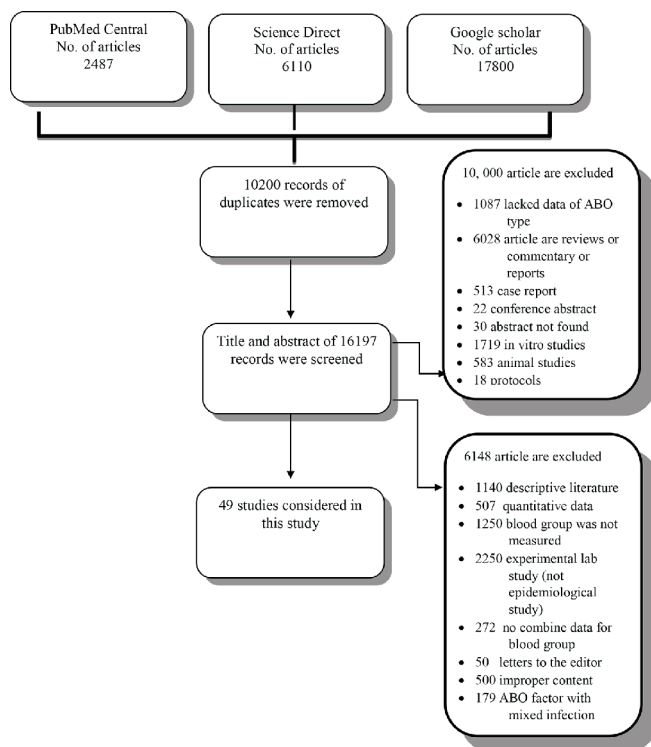


Fig 1. Number of publications in different countries
Supplementary data 1**Table 4. Comparison of distribution of ABO and Rh blood group between present study and other studies**

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
Bangalore (India) ¹⁰	23.86	29.95	6.37	39.82	94.2	5.79
Vellore (India) ¹¹	18.85	33.67	5.27	42.21	97.3	2.7
Bangladesh ¹² (Dinajpur)	26.6	23.2	9.6	40.6	96.8	3.2
Ghana	24.3	20.7	5.0	50	93.8	6.2
Uganda ¹⁴	25.0	20.4	4.3	50.3	97.9	2.03
Niger-Delta ¹⁵	23.8	20.7	2.8	52.7	93.9	6.12
Tanzania	26	19	3	52	98	2
Saudi Arabia ¹⁷	33.4	6	3.8	56.8	92.8	7.2
Pakistan ¹⁸	22.91	35.36	9.32	32.41	92.03	7.97
Bangladesh ¹⁹	24.1	34.5	9.6	33	97.1	2.89
Gujarat (India) ²⁰	23.3	35.5	8.8	32.4	94.2	5.8
Germany ²¹	41	11	5	41	85	15
West Iran ²² (khurdish)	37.22	17.86	7.75	37.15	91.1	8.9
Pakistan ²³ (Peshawar)	31.2	31.7	10.1	27	92.5	7.5

CONCLUSION

In present study distribution of blood group in the students of Universal college of Medical Sciences was observed. The present study concludes that the most common blood group is O followed by B and A and least common blood group is AB. 95.4% of the participants are Rh positive and only 4.6% are Rh Negative. Only few studies have been done in Nepal on blood groups and several studies are conducted in different states of India with various results. As this study includes medical students who come from several districts of Nepal and different states of India, this data represents the overall distribution of ABO and Rh blood in Nepal and India. The Knowledge about the blood group is again important in medical students because they can serve as immediate blood donors in emergency condition in hospitals.

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CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests.

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