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Blood Groups and their Association with Academic Performance among Medical Students in a Nepalese Medical College

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ABSTRACT

Introduction

Knowing a person's blood type is not only important in transfusion medicine and forensic medicine but is also useful for predicting a person's characteristics including intelligence, knowledge, skill and behavior. It is recognized that intelligence, knowledge and skill are assessed by performance in examination. The objective of this study was to determine distribution of blood groups among students and its association with their academic performance.

Methods

This was an analytical study that was conducted among the medical students of Nepalese Army Institutes of Health Sciences (NAIHS) in Department of Clinical Physiology from June 2014 to April 2019. This study was conducted among 738 students by using convenient sampling method. Blood group was determined on the basis of agglutination reaction. Academic performance of students was assessed by the marks obtained by them in annual final examination.

Results

Blood group O was the most prevalent at 33.5%, followed by B at 29.5%, A at 29% and AB at 8%. Distribution of Rh positive and Rh negative were 96.6% and 3.4% respectively. The mean scores obtained in final university examination were highest in blood group A (62.9%) and lowest in blood group AB (60.3%) but the difference between different blood groups was not statistically significant.

Conclusion

Blood group O was the most common blood group. Rh positive was present in 96.6%. Though mean score was highest in blood group A, significant association between blood groups and academic performance was not seen in our study.

Keywords: *ABO, academic performance, blood groups, medical college, Nepal, Rh*

INTRODUCTION

ABO and Rh antigens that are present on red blood cell (RBC) membrane are genetically predetermined and are unchanged throughout life.[1] ABO blood groups are classified by presence or absence of A and B antigens on red cell membrane; and their corresponding antibodies anti-A and anti-B are accordingly present or absent in the plasma.[2] Additionally, other antigens that are medically important and are often grouped with ABO system is Rhesus factor (Rh). Rh blood group is labelled as positive or negative on the basis of presence or absence of Rh antigens on the RBC membrane. There are six Rh antigens C,

D, E, c, d and e on RBC with no naturally occurring antibodies in plasma. Out of these six Rh antigens, only D antigen is immunologically significant.[3]

A, B and O blood groups were discovered by Austrian scientist Karl Landsteiner in 1901 AD for which he was later awarded Nobel Prize in Physiology or Medicine in 1930. AB blood group was discovered by Alfred von Decastello and Adriano Sturli in 1902 AD.[4,5] Rh factor was jointly discovered by Landsteiner and Weiner.[6]

Knowing one's blood type is important for prevention of transfusion reaction and miss-match between blood groups of the recipients and donor.[7] Additionally, it is useful for individual identification such as in forensic medicine and for identification of relationships in family dispute because blood group is inherited from parents to offspring.[8]

Academic performance is one of important tools for predicting a student's intelligence, knowledge and is a tool for grading superior and intellectual capacities in scholastic activities.[9] In the modern era, everyone is competing with each other for achieving better food, shelter and life; and reputed hospitals, banks, universities, corporate business houses recruit their students and employees on the basis of their academic performance i.e. percentage or marks obtained in schools, colleges and universities. The encoding knowledge, learning style, attitude and aptitude are different in different persons and it may be the reason that some students excel academically while others are under-achievers.[10] It has also been recognized that intelligence and knowledge are influence by genetics.[11]

Universally, in schools, colleges, universities, method of assessing intelligence and knowledge are through taking exam or tests and academic achievement plays important role in keeping scientific innovation up to date and conscientious in task and goal oriented and this is key mediator for future success. It has been established that personal character influences the academic performance.[12]

Several researchers around the world have conducted studies to find the co-relation between blood groups and personal character but failed to show their relation. Still Japanese and Koreans believe that there is association between personal character and blood groups.[13]

There are several studies that have reported the association of academic performance to blood groups in the world whereas there is deficiency of such reports in Nepal. Therefore, this study aims to find whether there is any association between blood groups and academic performance.

METHODS

This was an analytical study which was conducted among the medical students of Nepalese Army Institutes of Health Sciences (NAIHS) in Department of Clinical Physiology from June 2014 to April 2019. Ethical approval was taken from the Institutional Review Committee of NAIHS. All medical students who were admitted in the college during the study period were included in this study.

Blood group was determined on the basis of agglutination reaction while mixing the RBCs suspended in isotonic saline with monoclonal antisera anti A, anti B, anti D on different glass sides and results were compared with the control sample. In case of doubt, confirmation was done by observing agglutination in microscope. The blood samples for analysis were taken by finger pricks of the students after obtaining their consent. Academic performance of students was assessed by marks obtained by them in the annual final examination conducted by Tribhuvan University that includes the sum of theory, practical and viva marks. The total marks were calculated in percentage.

Data was analyzed by using IBM SPSS Statistics software. The association of academic performance with blood groups was analyzed with one-way ANOVA test and independent t-test by comparing the mean scores. For all analyses, p-value <0.05 was considered statistically significant.

RESULTS

Among the 738 students studied, O blood group was the most prevalent at 33.5% followed by B at 29.5% and A at 29% and AB at 8% (Table 1). Distribution of Rh positive and Rh negative groups were found to be 96.6% and 3.4% respectively.

Blood group A scored the highest mean marks, while it was lowest in the AB blood group. Though there was difference in mean scores, the difference was not statistically significant (p=0.33). Also, the

Table 1. Distribution of blood groups among the medical students (n=738)

Blood groups	Frequency (%)
ABO system	
A	214 (29.0)
B	218 (29.5)
AB	59 (8.0)
O	247 (33.5)
Rh system	
Rh positive	713 (96.6%)
Rh negative	25 (3.4%)

Table 2. Association of blood groups and academic performance

Blood groups	Score % (mean±SD)	p value
ABO system		
A	62.9±9.92	0.33
B	61.7±10.74	
AB	60.3±10.73	
O	61.7±10.44	
Rh system		
Rh positive	61.8±10.5	0.23
Rh negative	64.0±7.2	

mean scores were not statistically significantly different between Rh positive and Rh negative groups (p=0.23).

DISCUSSION

Despite identical phenotypes gene of ABO and Rh system, the distribution of blood groups around the world vary in different geographical and socio-economic groups. In our study, the percentage distribution of O blood group was 33.5%, B was 29.5%, A was 29% and AB was 8% with 96.6% of Rh positive and 3.4% of Rh negative, indicating blood group O as the most common while blood group AB is the least prevalent. These results are similar to the findings of different studies which were carried out in Nepal (Table 4).[14-17] In our study, blood group B was the second common blood group which is similar to findings of Upadhyay et al.[15] All other studies have reported blood group A as the second commonest blood group in Nepal.[14,16,17]

Similar results were found in various studies conducted around the world which have revealed that blood group O is the commonest blood group while blood group AB is the rarest one.[18-25] In India, B is the second commonest blood group, which is similar to our finding.[18] Blood group A has been reported as the second commonest blood group after O in many countries like Iraq, Iran, Libya, Mauritania, Cameroon, Morocco and Mexico.[19-25]

Several studies have recognized that there is association between blood groups and intelligence, knowledge, skills, habits, and academic performance.

The study carried out in students of six Jordanian universities have found highest IQ and GPA in individuals with AB phenotype and lowest GPA in individuals having B phenotype of blood groups.[26]

Similar study conducted by Sarvottam K et al among the medical students have found that students of blood group O received highest percentage of score in the first year examination. But the difference in scores among different blood groups was not statistically significant.[27]

The studies performed by Naveed et al and Dehghani et al have found significant correlation of blood groups with proficiency in computer gaming and mental toughness. In both of these studies, participants with O blood group were found to be more superior.[28,29]

CONCLUSION

Blood group O is the commonest blood group. Mean score obtained was highest in blood group A. Significant association was not found between blood groups and academic performance.

Further studies need to be carried out in various other colleges such as other medical, engineering, information technology and management colleges as well as schools to investigate the association between blood groups and academic performance.

Table 3. Comparison of pattern and distribution of ABO and Rh blood groups in studies carried out in Nepalese population

Study	Pattern	ABO system (%)				Rh system (%)	
		A	B	AB	O	Rh +ve	Rh -ve
Shrestha et al, among donors in blood bank of TU Teaching Hospital[14]	O>A>B>AB	29.7	27.0	8.2	35.1	97.3	2.7
Upadhyay et al, among students of five different medical colleges[15]	O>B>A>AB	28.17	30.17	6.79	34.87	95.38	4.62
Pramanik et al, among students of two medical colleges[16]	O>A>B>AB	28.5	27.3	8.7	35.5	99.92	0.8
Sah et al, among school students[17]	O>A>B>AB	34.3	27	3.9	34.8	98.6	1.4
Present study, among medical students	O>B>A>AB	29	29.5	8	33.5	96.6	3.4

CONFLICT OF INTEREST

None declared.

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