ABO Blood Group Distribution and its Association with Myopia among First Year Medical Students in Bangalore - A Cross Sectional Study

Sonal R. Gaonkar[1], Nalini Y C[2], Nibedita Acharya[3], Anjusha IB[4]

ABSTRACT

Introduction: It has been hypothesized that there exists some correlation between myopia and ABO blood group. Current study aimed to study the distribution of ABO blood group among first year medical students and also to assess the association of myopia among different blood groups.

Material amd method: A cross sectional study conducted by Department of Physiology on first year medical students in a medical college in Bangalore.Blood group of the subjects was determined by slide method and microscopy and details regarding myopia and family history of myopia were collected via questionnaire from participants who confirmed usage of spectacles or contact lenses for vision correction.

Results: Of the total 142 subjects, 77(54.2%)were males and 65 (46%) were females. Most common ABO blood group in this population was found to be B positive (33%) followed by O positive (30%). Out of 142 participants, 46(32.39%) were Myopics, i.e 24(16.9%) females and 22 (15.49%) males. B blood group showed higher prevalence of myopia when compared to other ABO blood groups. Odds ratio done to compare risk of Myopia between B and Non B blood groups revealed that B blood group showed higher risk (Odd's ratio 1.70) of myopia but this was not statistically significant. Relative risk of myopia was higher in Rh positive group (1.09) in comparison to Rh negative blood group and it was not statistically significant.

Conclusions: B blood group participants showed slightly higher prevalence of myopia as compared to other blood groups but it was not statistically significant.

Keywords: ABO Blood Groups; Myopia; Medical Students; Association

INTRODUCTION

The first human blood group, that is, the ABO system discovered by Landsteiner, is the most commonly used blood system although many blood systems have been identified so far. The discovery of ABO system and findings of red cell agglutination in serum and recognition of blood groups laid the scientific basis for safe practice of blood transfusion.[1,2]

ABO and Rh systems have major clinical significance and they are determined by the nature of different proteins present on the surface of red blood cells.[3] The study of distribution of blood groups is important as it plays a vital role in genetics, blood transfusion, organ transplantation, genetic research, human evolution. The genetic inheritance pattern of ABO blood groups has been well documented. The association of blood groups in some diseases has been documented by different workers.Association between cancer stomach and blood group A has been stressed.[4] One correlation study in hypertensive and migraine patients' found maximum incidence of the disease in blood group O and minimum in blood group AB patients.[5]

Myopia, a common refractive error, occurs with some familial tendency and is strongly suggestive of genetic causation.[6] Reading, writing, outdoor exposure and family history are commonly seen as major risk factor for causing myopia.[7] Wold in his study on familial myopia suggested that refraction as a whole or its components are genetically determined and that a low degree of myopia is probably autosomally dominant.[8] While another study in Finland by Vorpio et al conducted over 4 generations noted that in case of a mother who had a myopia of 5 D, in the subsequent 3 generations of offsprings, many had varying degrees of myopia proving that there is a substantial evidence of inheritance from parent to offspring.[9]

Thus the possibility of an association between blood groups and refractive errors cannot be ruled out. The present study was therefore, undertaken to assess the association if any, between myopia and ABO blood groups as ABO blood group has a genetic basis.

MATERIAL AND METHODS

A cross sectional study was undertaken among the first year medical students of a Medical college in Bangalore. The students who were not willing to participate in the study were excluded from the study. A total of 142 medical students constituted the study sample. Informed consent was obtained from the participants. Blood group of the subjects

[1]Associate Professor, Department of Physiology, BGS Global Institute of Medical Sciences, Bengaluru, [2]Assistant Professor, Department of Physiology, MGMCRI, Affiliated to Sri Balaji Vidyapeeth (Deemed to be university), Puducherry, [3]Professor and Head, Department of Ophthalmology, BGS Global Institute of Medical Sciences, Bengaluru, [4]Associate Professor, Department of Physiology, BGS Global Institute of Medical Sciences, Bengaluru, India

Corresponding author: Dr. Nalini Y C, Department of Physiology, MGMCRI, Affiliated to Sri Balaji Vidyapeeth (Deemed to be university), Puducherry, India

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Gender	Blood group distribution								Total N (%)
	A+ N (%)	B+ N (%)	AB+ N (%)	O+ N (%)	A- N (%)	B- N (%)	AB- N (%)	O- N (%)	
Male	16 (55.2)	23(48.9)	9(81.8)	24(57.1)	0	2(66.7)	1(100.0)	2(25.0)	77 (54.2)
Female	13(44.8)	24(51.0)	2(18.2)	18(42.9)	1 (100)	1(33.3)	0	6(75.0)	65 (45.7)
Total	29(20.4)	47(33.1)	11(7.7)	42(29.6)	1(0.7)	3(2.1)	1(0.7)	8(5.6)	142(100)

Table-1: Gender distribution of various blood groups in medical students

was determined by slide method using red cell suspension in 0.9% saline and matching it against anti A, anti B and anti D antisera and microscopy. Details regarding myopia and family history of myopia were collected via detailed questionnaire from participants who confirmed usage of spectacles or contact lenses for vision correction and they were again tested for refraction in the Ophthalmology department. Institutional Ethical clearance was obtained for the study. The data thus obtained was tabulated in Microsoft Excel version 10. All Statistical analysis was done using SPSS version 21. Test like Odds ratio, Pearson's chi-square test etc were applied wherever required. Odds ratio >1 and P value of < 0.05 were considered statistically significant.

RESULTS

A total of 142 subjects participated in the study, of which 54% were males and 46% were females. The mean ageof the participants was 18years. B positive (33%) blood group was the most common ABO blood group in this study followed by O positive (30%), A positive (20%) and AB positive (7.4%) blood group (Table 1).

Out of 142 participants, 46 (32.39%) were Myopics,16.9% were females and were 15.49% were males, while 67.61% were Non myopics which was statistically significant (Table 2).

B blood group showed higher prevalence of myopia (40%) followed by blood group A (36.7%), blood group AB (33.3%) and blood group O (22.0%) respectively. The risk for the occurrence of myopia in different blood groups was calculated and the highest risk of myopia was found in blood

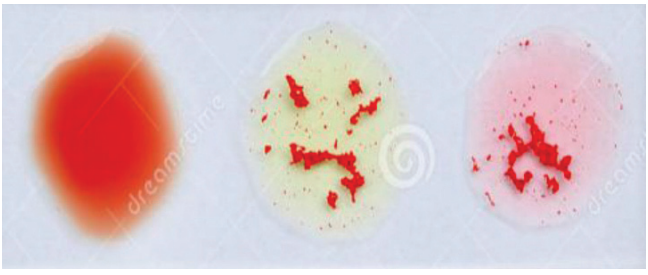

Figure-1: Blood grouping by slide method

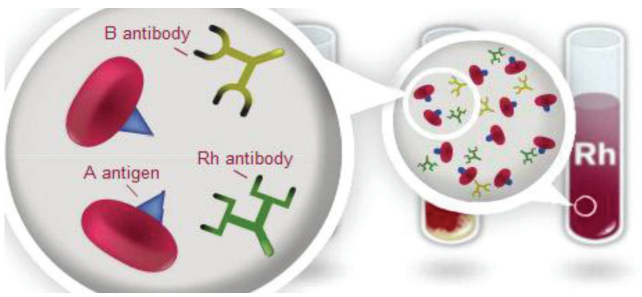

Figure-2: Microscopic view of ABO Blood group - Antigen Antibody reaction (agglutination)

Gender	Myopics N (%)	Non myopics N (%)	Total N (%)
Males	22 (15.5)	55 (38.7)	77 (54.3)
Females	24 (16.9)	41 (28.9)	65(45.7)
Total	46 (32.39)	96 (67.6)	142 (100)
$\chi 2$ Value=6.66; df=1; p value, sig=0.01, Sig			

Table-2: Gender distribution among Myopics and Non myopics

Blood group	Myopics N (%)	Nonmyopics N (%)	Total N (%)
A	11 (36.7)	19 (63.3)	30 (21.1)
B	20 (40.0)	30 (60.0)	50 (35.2)
AB	4 (33.3)	8 (66.6)	12(8.4)
O	11 (22.0)	39 (78.0)	50 (35.2)
Total	46 (32.4)	96 (67.6)	142 (100.0)
$\chi 2$ Value=4.04, df=3; p value, sig=0.257, NS			

Table-3: Association of blood group with respect to myopia distribution among medical students

	Myopics N (%)	Nonmyopics N (%)
B blood group	20 (40.0)	30 (60.0
Non B blood groups	26 (28.3)	66 (71.7)
Total	46 (32.4)	96 (67.6)
$\chi 2$ Value=2.038; df=1; p value, sig=0.153, NS		

Table-4: Odds ratio to compare risk of Myopia among B and Non B blood groups

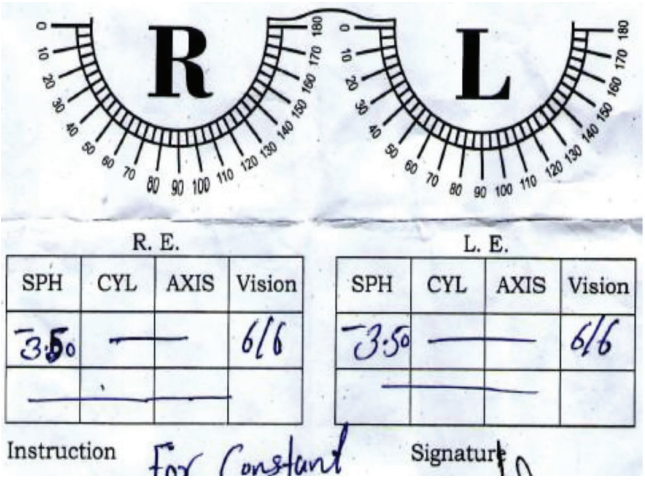

Figure-3: Examination slip of Refraction test

	Myopics N (%)	Nonmyopics N (%)
Rh positive blood group	42 (32.6)	87 (67.4)
Rh negative blood group	4 (30.8)	9 (69.2)
Total	46 (32.4)	96 (67.6)
$\chi 2$ Value=0.017; df=1; p value, sig=0.895, NS		

Table-5: Odds ratio to compare relative risk of Myopia among Rh positive and Rh negative blood groups

group B which was not statistically significant (Table 3).

Odds ratio done to compare risk of Myopia between B and Non B blood groups (Table 4) was 1.70 but it was not statistically significant. This implies that odds of getting myopia in B blood group was 1.7 times when compared with the non B blood group.

The prevalence of myopia was 30% (42/142) in Rh positive individuals. On comparing the risk of developing myopia between Rh positive group and Rh negative blood group, Odd's ratio was 1.09. However it was not statistically significant. This indicates that the odds of getting myopia was 1.09 times in Rh positive subjects when compared to the Rh negative blood groups (Table 5).

DISCUSSION

The most common blood group in this population was found to be B blood group (33%) followed by O blood group (30%). This distribution complies with studies of Nishi et al[10] and Ved et al.[11]

About 46 participants out of 142 were myopics, of which 24 were females and 22 males. In our study, there is gender predisposition to develop myopia, slightly higher in females, unlike other studies.[10]

The highest prevalence of myopia was found in B blood group followed by A blood group, AB blood group and O blood group respectively. Seth et al[12] in Punjab also reported similar findings with blood group B predominating (35.84%) followed by groups A and O (both 24.52%) on correlation of blood groups in myopia patients. Parallely, other earlier studies also found blood group B to be have the highest frequency of occurrence in myopic patients further supporting our findings (Garg et al[13], Deshmukh et al[14], Nishi et al.[10] However, in contrast, Ved et al[11] & Arif et al[15] found blood group O subjects to have higher incidence of Myopia as compared to other blood groups.

The Odd's ratio of B blood group showed higher risk (1.70) of myopia when compared with Non B blood groups(Odd's ratio>1). But it was not statistically significant. Prevalence of myopia was 30% in Rh positive individuals. A predominant association of myopia was found with Rh positive blood groups (Odd's ratio of 1.09). However, it was not statistically significant.

Nishi et al in their study attributed the occurrence of the myopia to the presence or absence of antigen A and B. The presence of antibody A in blood group B increased the chances of myopia in B blood group individuals, resulting in maximum incidence of myopia and subsequent findings in blood groups A & O, while minimum incidence of myopia found in blood group AB, which was substantiated with absence of both antibodies being responsible for lesser chances of myopia.[10] More research is however required to substantiate this explanation.

CONCLUSION

In our study, we found B blood group having slightly higher risk of developing myopias when compared to other blood groups. Further studies with bigger sample sizes need to be undertaken in the future, to understand the link in between myopia and blood groups if any.

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