



Gene Frequency and Percentage Distribution of Abo Blood Groups in School Children of Visakhapatnam

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ABSTRACT

To determine the gene frequencies and percentage distribution of ABO blood groups in school children of Visakhapatnam. 600 students of a school participated in the study. Reports of 522 students were evaluated and the remaining was discarded. Gene frequencies were calculated using Hardy-Weinberg principle and Bernestein method. The most common blood group from the study was O+ve with 48.85% distribution followed by B+ve with 30.45% distribution, A+ve with 16.85% distribution and AB+ve with 2.87% distribution. B-ve blood group constituted 0.57% and the least percentage of distribution from the study was O-ve which was 0.38%. The gene frequency of O group was 0.699, A group 0.110 and B group 0.191. As there are variations in the geographical distribution of ABO blood groups, the results were compared with a study made from other region of Andhra Pradesh and p value was 0.4057 which is not significant statistically indicating the similar type of distribution in Visakhapatnam too.

KEYWORDS : ABO blood groups, Hardy-Weinberg principle, Bernestein method, gene frequency

INTRODUCTION

Classification of blood on the basis of presence or absence of antibodies or inherited antigenic substances gives rise to various forms of blood groups or blood types. As many as 35 human blood group systems have been identified by the international society of blood transfusion [1], amongst which ABO and RhD antigen are considered the most important. Karl Landsteiner discovered blood groups in 1901 and for his enormous pioneering work on blood groups, he is considered as the father of transfusion medicine [2]. Many studies were done in different geographical areas in the entire world. Japanese recorded 39.8% of population as A+ [3], Saudi Arabia registered 48% O+ [4] and a study in Nigerian population determined 53.22% of O blood group [5]. Indian studies showed 37.12% distribution of O blood group [6]. A study from Rajasthan [7] depicted B blood group as the most common type. Another study from Pune [8] reported that O blood group had the frequent occurrence. ABO blood type system monopolized the various aspects of transfusion medicine. On the other hand studies had proven its association with various pathologies and malignancies. It is necessary to know the distribution of ABO blood group system in various geographical areas. The present study was conducted on school children of Visakhapatnam to understand the frequency distribution of ABO blood system in this region of Andhra Pradesh.

MATERIALS & METHODS

After taking an informed verbal consent, data were collected from 600 students of a school. Under the guidance of parents, the students were asked to bring the reports of blood grouping and typing done previously in a hospital. The data without the proof of records was discarded. 78 such results were not considered and the evaluation was done on the reports of 522 students. Percentage phenotype distribution was done by taking the percentage of each blood type. Gene frequency was calculated by using Hardy-Weinberg principle and Bernestein method of frequency estimators [9]. P value was calculated using chi square test and degree of freedom.

RESULTS

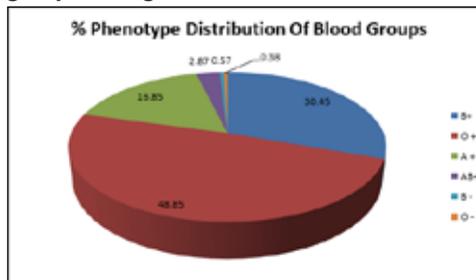
The reports of 522 students in a school of Visakhapatnam revealed the occurrence of blood group O as most common followed by B group, A group and the least prevalence of AB blood group with Rh positivity. O- ve blood group was recorded as the blood group with least percentage distribution. The reports were tabulated as follows:

Table 1: Distribution of blood groups among students of a school

S No	Blood group	Males	Females	Total (522)
1.	B +	97	62	159
2.	O +	122	133	255
3.	A +	46	42	88

4.	AB +	7	8	15
5.	B -	3	-	3
6.	O -	2	-	2

Graph 1: pie diagram depicting % distribution of blood groups among school students



Graph 2: Gender wise distribution of ABO blood groups

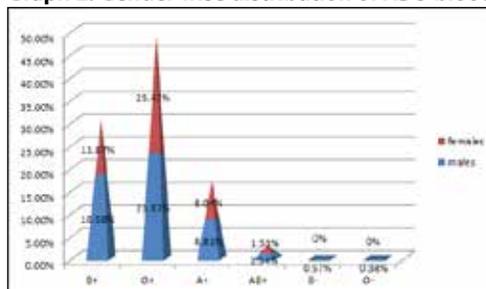


Table 2: %Phenotype distribution and Gene frequency of Observed and Expected values

S No	Blood Type	%Phenotype Distribution		Gene Frequency	
		Observed	Expected	Observed	Expected
1.	O	48.85	43.21	0.699	0.658
2.	A	16.85	20.38	0.110	0.140
3.	B	30.45	30.50	0.191	0.202
4.	AB	2.87	5.91		
	Total	100	100	1	1

Chi square was calculated using the formula-

$$\text{Chi square} = \sum \frac{(O-E)^2}{E} = \frac{(48.85-43.21)^2}{43.21} + \frac{(16.85-20.38)^2}{20.38} + \frac{(30.45-30.50)^2}{30.50} + \frac{(2.87-5.91)^2}{5.91}$$

Degree of freedom = 4-1=3; chi square = 2.91008

P value is 0.4057 which is not considered statistically significant.

DISCUSSION

The clinical significance of ABO blood group system has extended beyond transfusion medicine. The proven relationship of ABO blood type with the development of cardiovascular pathologies, GI diseases and oncologies clinches the importance of distribution of ABO blood types among different ethnic groups and geographic areas. The study determines the percentage distribution of ABO blood group system among school children of Visakhapatnam. It is evident that the highest percentage distribution is by O+ve blood group followed by B+ve, A+ve & AB+ve respectively. The least blood group type distributed was O-ve. When compared with a study from other region of Andhra Pradesh⁽¹⁰⁾, the values were close. The gene frequency was calculated and compared. P value was not significant indicating that the observed value is nearer to the expected value.

CONCLUSION

This study provides the data of percentage phenotype distribution and gene frequencies of ABO blood group system of school children of Visakhapatnam. Highest percent recorded was O+ve followed by B+ve > A+ve > AB+ve > B-ve > O-ve respectively. The gene frequencies match with the expected value denoting the similarity of distribution of blood types at different regions of Andhra Pradesh.

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