A Study of Effect of Demographic Variable (Blood Group) On Academic Achievement in Mathematics Among Secondary School Students

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Abstract*—The present study was carried out to examine the relationship between blood groups and academic achievement in mathematics among secondary school students. A sample of 465 students was selected from five secondary schools of Meerut district. The sample comprised 211 girls and 254 boys. Students' final examination marks in mathematics were considered as the measure of academic achievement, while data related to blood groups were collected from school records. The distribution of blood groups showed that blood group B was the most frequent (192 students), followed by blood group O (133), blood group A (95), and blood group AB (45). The findings of the study revealed that there was no significant difference between blood groups and academic achievement of secondary school students (F = 0.8217). Similar results were obtained when male and female students were analysed separately, as the F values for both groups were also not significant.

Index Terms*—Academic achievement, Blood Group, secondary school students.

I. INTRODUCTION

Heredity and environment play an important role in the all-round development of an individual. Together, they shape the behaviour and personality of a child or student. It is the responsibility of educational institutions and educators to provide a supportive social and educational environment so that students' personalities develop to their fullest extent, fulfilling both individual and social needs. In this regard, both heredity and environment are equally important, and neither can be ignored in understanding human development. Certain capabilities and capacities of an individual may arise due to environmental factors, while others are determined by genetic factors.

From a genetic perspective, blood group is considered a biological characteristic inherited from parents and remains unchanged throughout life. In recent times, blood groups have drawn the attention of researchers as a possible factor influencing various aspects of human behaviour, such as interests, attitudes, intelligence, personality traits, and academic performance. However, studies in the Indian context are limited. Unlike conventional research studies that mainly focus on psychological, social, and emotional variables, the present study goes beyond these factors to examine biological variable, namely blood group, in relation to academic achievement.

In this regard, if previous studies are reviewed, the findings are mixed. Some research has explored the relationship between blood groups and personality characteristics, intelligence, skills, and academic performance. For instance, a study titled "Comparison of Academic Performance of Students of Different Blood Groups and Gender" by Shumaela Kanwal, Maryam Rao et al., found no significant association between Rh-positive and Rh-negative blood groups. Academic scores of male and female students also showed no significant difference. However, students with blood group O had significantly higher mean scores compared to other blood groups.

Barun Mahat et al. (2019) reported no significant association between blood groups and academic performance among medical students of a Nepalese medical college. Although the mean score was highest among students with blood group A. Similarly, a study by Harrywati Tambunan titled "The Influence of Blood Type on Academic Achievement" reported no significant relationship between blood group and

academic achievement, emphasizing that achievement is not only influenced by internal factors but also by external environmental conditions.

In contrast, a study titled "Blood Group and Academic Performance in Science of B.Ed. Student-Teachers of Manipur" by Jocyline Thokchom and Laishram Nirtish Singh found that students with blood group A have higher academic performance in science compared to students with blood groups B, AB, and O. In the light of these varied findings, the present study attempts to examine the effect of blood groups on academic achievement in mathematics among secondary school students.

II. OBJECTIVES

1. To classify secondary school students in terms of their blood groups namely A, B, AB and O.
2. To study the effect of blood groups, namely A, B, AB and O on academic achievement in mathematics of secondary school students.
3. To study the effect of blood groups, namely A, B, AB and O on academic achievement in mathematics of secondary school male students.
4. To study the effect of blood groups, namely A, B, AB and O on academic achievement in mathematics of secondary school female students.

III. HYPOTHESES

1. There is no significant difference in academic achievement in mathematics among secondary school students belonging to A, B, AB and O blood groups.
2. There is no significant difference in academic achievement in mathematics among secondary school male students belonging to A, B, AB and O blood groups.
3. There is no significant difference in academic achievement in mathematics among secondary school female students belonging to A, B, AB and O blood groups.

IV. RESEARCH METHODOLOGY:

Following research steps have been discussed under it:

Research method: The survey method of research was used in the present study. The method was selected as the method describes the present status of the phenomenon which is the main focus of the study. A pro forma was prepared to collect the information regarding the blood groups and academic achievement in mathematics among secondary schools' students. The students' final examination marks in mathematics were considered as their academic achievement.

Population of the Study: The population of the study consisted of all secondary school students studying in C.B.S.E., New Delhi affiliated schools in Meerut urban area, Uttar Pradesh.

Sample of The Study: The sample of the study consisted of 465 male and female students studying in secondary schools recognised by central board of secondary education New Delhi and located in the urban area of Meerut, Uttar Pradesh.

Sampling Technique: The Researcher used the lottery method of random sampling for collecting the data.

Tool Used for Data Collection: A self made pro forma was given to students to exclude the information regarding their blood groups and their final examination results.

Statistical technique used in the study: Data was analysed by using the one-way Analysis of Variance (ANOVA). MS Excel and SPSS were used for statistical analysis of data.

Table no. 1

Distribution of secondary school students selected for the study in terms of their blood groups. (N=465)

Blood Groups	No. of students	Percentage
A	95	20.43
B	192	41.29
AB	45	9.68
O	133	28.60
total	465	100%

Table no. 1 shows the distribution of students in terms of their blood groups. The total number of students included in the study was 465. The most frequent blood group in the study was B blood group (41.29%) followed by O blood group (28.60%) and A blood

group (20.43%) and the least frequent blood group was AB (9.68%).

Table no.-2
Analysis of Variance (ANOVA) Showing the Significance of Difference in Academic Achievement in Mathematics Among Secondary School Students in terms of Their Blood Groups

source of Variance	df	sum of square	mean square (Variance)MS	F value	level of significance
among the mean of condition	3	793.006	264.335	0.8217	not significant
within condition	461	148304.985	321.703		
total	464	149097.991			

Findings:
Table no. 2 displays the distribution of academic scores in mathematics among male and female secondary school students belonging to A, B, AB and O blood groups, analysed by using ANOVA. The sum of squares between groups was 793.006 while the sum of squares within groups was 148304.985. Furthermore, the mean square between groups was 264.335 and the mean square within groups was 321.703. The difference among the mean scores belonging to different blood groups was not statistically significant as obtained F value was 0.8217. It was not significant at 0.05 level of significance. Therefore, the null hypothesis was accepted stating that secondary school students' achievement scores in mathematics do not differ significantly in terms of their blood groups namely A, B, AB and O.

Table no-3
Analysis of Variance (ANOVA) Showing the Significance of Difference in Academic Achievement in Mathematics Among Secondary School Male Students in terms of Their Blood Groups

source of Variance	df	sum of square	mean square (Variance) MS	F value	level of significance
among the mean of condition	3	959.169	319.723	1.0424	not significant
within condition	250	76679.461	306.718		
total	253	77638.630			

Findings:
Table no. 3 displays distribution of academic scores in mathematics among secondary school male students belonging to A, B, AB and O blood groups, analysed by using ANOVA. The sum of a square between groups was 959.169 while the sum of squares within groups was 76679.461. Furthermore, the mean square between groups was 319.723 while the mean square within groups was 306.718. The table displays that the difference between the mean squares belonging to different blood groups was not statistically significant as the obtained F value was 1.0424 that was not significant at 0.05 level of significance. Therefore, the Null hypothesis was accepted, indicating that blood group does not have a significant effect on academic achievement in mathematics among secondary schools' Male students.

Table no. 4
Analysis of Variance (ANOVA) Showing the Significance of Difference in Academic Achievement in Mathematics Among Secondary School Female Students in terms of Their Blood Groups

source of Variance	df	sum of square	mean square (Variance) MS	F value	level of significance
among the mean of condition	3	172.433	57.478	0.1674	not significant
within condition	207	71078.230	343.373		
total	210	71250.664			

Table no. 4 displays distribution of academic scores in mathematics among secondary school female students belonging to A, B, AB and O blood groups, analysed by using ANOVA. the sum of a square between groups was 172.433while the sum of a square within groups was 71078.230. Furthermore, mean square between groups was 57.478 and mean square within group was 343.373. The table has displayed the difference of mean squares belonging to different blood groups was not statistically significant. Obtained F value was 0.1674 that was not significant at 0.5 level of significance Therefore, the null hypothesis was accepted revealing that the blood group does not have a significant effect between the blood groups and academic achievement among secondary school girls' students.

V. RESULTS

The present study consisted of 465 secondary school students belonging to different blood groups. The B blood group was found to be most prevalent followed by O blood group and A blood group and the least prevalent was AB blood group (table-1). The study was examined by using one-way ANOVA to reveal whether academic achievement in mathematics differed significantly among secondary school students with different blood groups, namely A, B, AB and O. The obtained F value (F=0.8217) was not significant at 0.5 level of significance. That shows the blood group has no significant effect on academic achievement in mathematics of secondary school students. Similar results were obtained on analysing the male students and female students independently. F value was not significant at 0.5 level of significance.

VI. CONCLUSION

On the basis of present study, it is concluded that there is no significant difference in mathematics achievement of secondary school students belonging to different blood groups namely A, B, AB and O. Similar results were found when male and female students were analysed separately. In the light of these findings, it can be stated that blood group does not affect the academic achievement in mathematics among secondary school students.

VII. DELIMITATIONS

1. The study was limited to 465 secondary school students only.
2. The Rh factor of blood groups was not considered in the study.
3. The geographical area was restricted to Meerut city (U. P.) only.

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