

## RESEARCH ARTICLE

# Gender-based variations in academic performance of MBBS students of different blood groups

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### ABSTRACT

**Background:** Blood group has been observed to associate differentially with personality and character traits, emotional intelligence and occurrence as well as pathogenesis of various diseases. Academic performance remains one of the important tools to determine intelligence of students, but in contrast, there are only few studies, which have correlated blood group and academic performance, and results of these studies are also of no consolidated opinion. **Aims and Objectives:** This study was aimed to compare academic performance of medical students of different blood groups and gender wise academic performance of students of different blood groups. **Materials and Methods:** A total of 285 students of two consecutive batches of MBBS 1<sup>st</sup> year were recruited in the study. Blood group of each student was determined by slide method and marks obtained in the first professional MBBS examination were tabulated. Difference in academic performance was statistically tested by one-way ANOVA and independent sample *t*-test. **Results:** There was no significant difference among four blood groups in terms of marks obtained ( $P = 0.705$ ), though “O” blood group student achieved highest marks. Gender-specific analysis shows female students scored higher marks as compared to males ( $P = 0.001$ ) and “AB” positive students were highest scorer overall ( $P = 0.017$ ). **Conclusion:** Blood group may be one of the determinants of academic achievement and gender-dependent differences in academics may have blood group-based variations among medical students, although further studies need to be done to substantiate this.


**KEY WORDS:** Blood Group; Intelligence; Gender; Academic Performance; Medical Students

### INTRODUCTION

Human blood group is decided by the presence of agglutinogens on the red blood cell. The most important and best known of these agglutinogens are the A and B antigens.

The A and B antigens are inherited as Mendelian dominants, and individuals are divided into four major blood types on the basis of the presence of agglutinogens. Type A individuals have the A antigen, Type B have the B, Type AB have both, and Type O have neither. The presence of Rh antigen adds to further variability classifying each of the four blood groups as Rh - positive or Rh - negative by the presence or absence of Rh antigen, respectively.<sup>[1]</sup>

Since the blood group has been found to associate differentially with occurrence and pathogenesis of various diseases, for example, cancer and bleeding disorders are more commonly observed in Group A, peptic ulcer and clotting disorders are more common in blood Group O, infections preferentially

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occur in blood Group A followed by B, O, and AB.<sup>[2]</sup> Similarly, malaria severity also has blood group selectivity of A over O in sub-Saharan Africa. Depressive illnesses are more common in A and O blood group, particularly in A<sup>+</sup> and O<sup>+</sup> blood groups.<sup>[3]</sup> Similar stratification of various other medical illnesses has been described in conjunction with ABO. Hence, there are reasons suggestive of blood groups and their association with other heritable traits.

There are ample evidences to suggest the association of personality traits with blood groups. Studies have found an association of strong statistical significance for premsia versus harria (“tender-minded vs. tough-minded”), A blood type being more premsic, and O, B, and AB more harric, in that order.<sup>[4]</sup> Similarly, many researchers have shown association of dependence and high reward dependence, anger versus low anger, and many other traits with blood groups.<sup>[5]</sup>

On the other hand, there are certain evidences suggestive of non-conclusiveness of blood group association to character traits. An observation made on Malaysian student population to know the association of character traits with blood group concluded that there were no significant differences in character traits among blood groups A, B, AB, or O.<sup>[6]</sup> There are studies in same line suggestive of no association of blood groups with intelligence, introversion-extraversion, and idiosyncrasy.

There are studies suggesting significant relation between ABO blood groups and emotional intelligence.<sup>[7]</sup> In a study conducted to compare correlation of blood group and intelligence quotient (IQ) in rural and urban population indicated differential correlation of blood group and IQ, it also revealed gender association in both population with IQ.<sup>[8]</sup>

Although there are several studies focused primarily on different aspects of personality, behavior, and emotional intelligence, very few have investigated regarding relation of blood group with academic performance, which is an important aspect to determine intelligence. These studies also fail to provide a consolidated opinion due to their contrasting results, so in the current study, we decided to study the relation of academic performance of the 1<sup>st</sup> year MBBS students with blood group.

Gender-based academic differences have been debated in the literature, these studies have been done in different streams of academics and gender-specific differential abilities have been reported. One study focused on gender and academic achievement of students of social studies revealed that female students performed better than male students.<sup>[9]</sup> Gender-based academic differences are present and gender may strongly mediate perception and behavior of students, in or out of the school, and so the academic performance.<sup>[10]</sup> There are studies suggesting either subject-specific academic difference among male or female students such as female scoring better in literature and male in mathematics<sup>[11]</sup> or computer.<sup>[12]</sup>

Gender may have effect on academic performance of medical students.<sup>[13]</sup>

Since academic performance has gender wise differences in different streams, so in this study, we decided to investigate the effect of gender on academic performance of medical students. Blood group may be another variable deciding academic performance so we also studied the effect of gender on academic performance of medical students of different blood groups.

## MATERIALS AND METHODS

A total of 285 1<sup>st</sup> year MBBS students of two consecutive batches were screened for the blood grouping after obtaining informed written consent.

The method for blood group detection used was slide method. In this method, a glass slide was divided into three parts, each part; a drop of blood obtained by sterilized fingertip prick was mixed with anti-A, anti-B, and anti-D separately. Slides were observed for agglutination.<sup>[14]</sup>

Academic performance of aforementioned students was recorded in terms of marks obtained in the 1<sup>st</sup> year professional MBBS examination. Total marks for each blood group were calculated and average marks obtained by each respective group students were derived. Average marks of total were calculated and percentage difference of average marks of each group from average of total was calculated.

For gender-based calculation first of all, students were divided into two groups as male and female. Marks obtained by these two groups were compared by independent sample *t*-test.

Further, entire students were divided into eight groups as four blood groups from each gender, for example, A - blood group male and A - blood group female. For comparing these groups, marks obtained by each group were compared using one-way ANOVA and *post hoc* Tukey's HSD was applied to check the difference between individual groups.

For comparing marks of Rh+ve and Rh-ve blood group students, independent sample *t*-test was applied.

For all comparisons, SPSS version 22 was used.  $P \leq 0.05$  was considered statistically significant for all comparisons.

Ethical permission was obtained from the institute's ethical committee.

## RESULTS

Of total 285 students (male = 182, female = 103), 66 students had A blood group (62 A +ve and 4 A -ve), 97 students had

B blood group (92 B +ve and 5 B -ve), 29 students had AB blood group (28 AB +ve, 1 AB -ve), and 93 students had O blood group (88 O+ve and 5 O-ve) [Figure 1].

Results show that there was no significant difference ( $P=0.705$ ) in different blood groups in terms of marks obtained. Calculated percentage marks distribution was highest for blood group O while it was lowest for blood group B numerically [Figures 2 and 3]. There was no significant difference ( $P = 0.854$ ) between Rh positive and Rh negative blood group [Figure 4].

Gender-specific marks analysis shown, in general, females achieved significantly higher marks ( $P = 0.001$ ) than males [Figure 5]. Gender-specific analysis shows significant differences in marks ( $P = 0.017$ ) obtained by different blood groups, with AB - positive females being highest scorers [Figure 6].

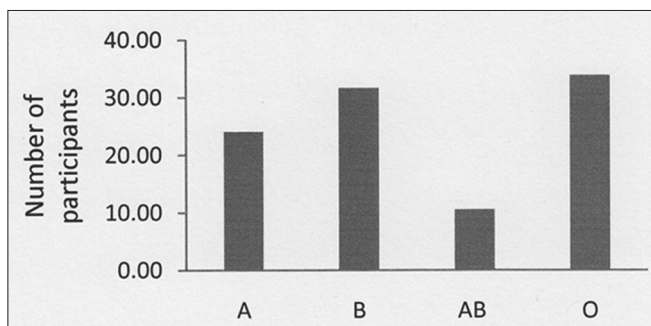
**DISCUSSION**

Findings in our study suggest that there is no clear relationship between academic performance of medical students of different blood groups although students with “O” blood group have secured higher marks as compared to others. A study done on medical students found that “O” blood group students secured higher marks as compared to “A” blood group<sup>[15]</sup> and concluded as although there were differences of academic performance among medical students, but there was no association of blood group and academic performance. Another study done in similar line on medical students has found contrasting results as “A” blood group had

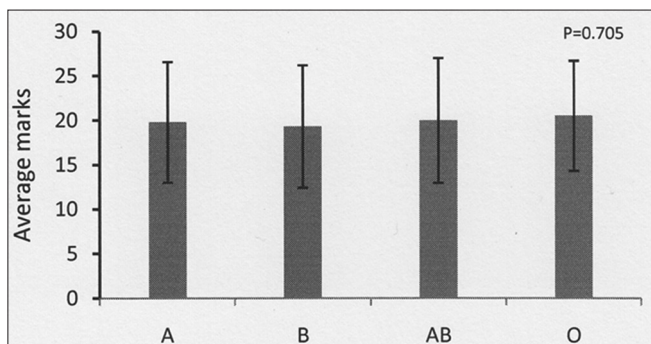
higher academic performance as compared to other groups, but the method of comparison was based on percentage of students among each blood group securing more than 60% (high performance) rather than direct comparison of mean marks among each blood group.<sup>[16]</sup>

Study performed in Jordanian University assessed IQ of students of six Jordanian University found that blood group “AB” has highest IQ and they are highest in GPA too while “B” blood group students were lowest in these.<sup>[17]</sup>

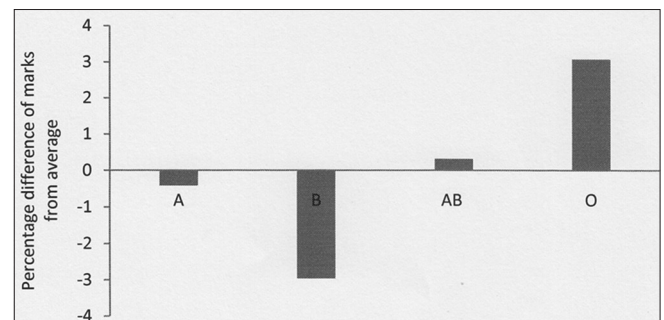
We did not get any significant difference of academic performance among “Rh” positive and “Rh” negative blood group students. Numbers of students enrolled among both groups in this study were not comparable, so the results are not predictive of actual differences, if any.



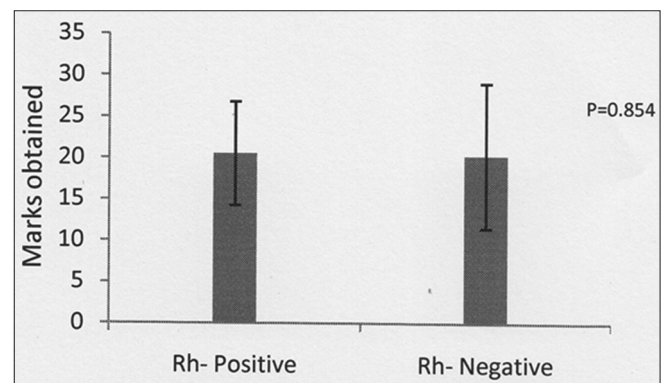
**Figure 1:** Percentage blood group distribution



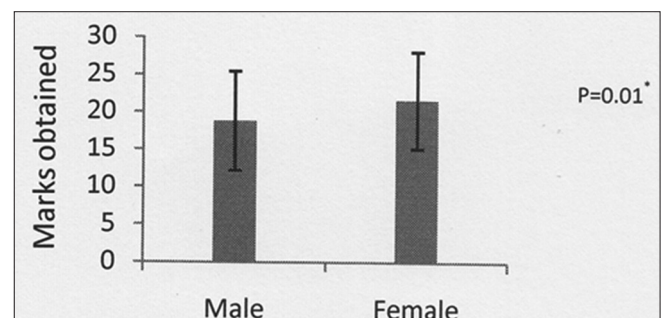
**Figure 2:** Marks distribution in each blood group



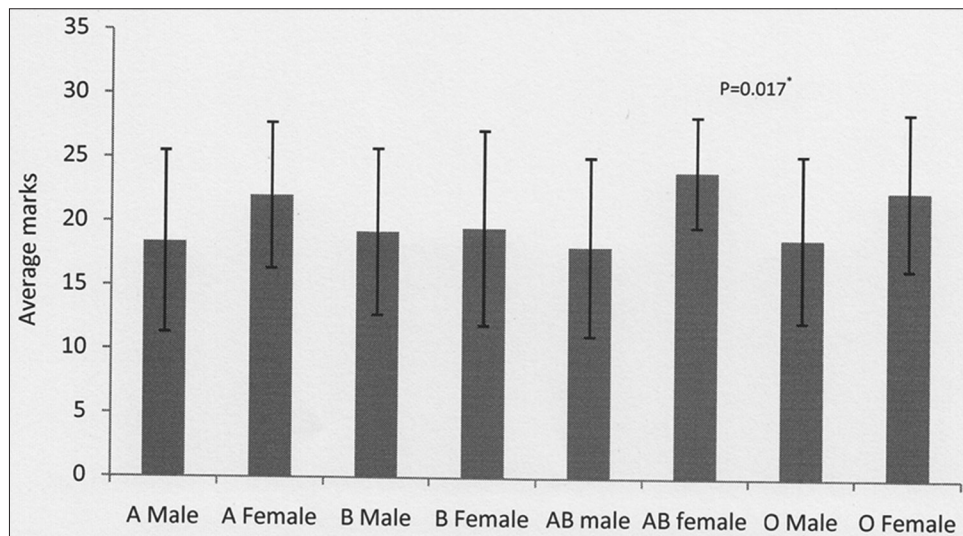
**Figure 3:** Percentage difference of average marks of each group from average of total marks



**Figure 4:** Marks obtained by Rh - positive and Rh - negative blood group



**Figure 5:** Gender-specific marks of students.\*significant difference



**Figure 6:** Gender-specific average marks in each blood group. \*significant difference

Gender-specific variations were found in this study where females scored better than males. There are studies supporting the finding in other streams of academics where females performed better than males.<sup>[10]</sup> Another study found that females got higher marks in literature while male students scored better in mathematics.<sup>[12]</sup> There are many contrasting findings regarding academic performance among males and females in different studies, some found no gender-based academic difference<sup>[18]</sup> while others found female as better performer as compared to males once they are admitted to the university although their entry marks were lower than males.<sup>[19]</sup> Another study evaluated gender based different aspects of academics and reported differential achievements.<sup>[11]</sup>

We have reported gender wise differences in academic performance in terms of marks achieved among medical students. Prior to this there is only one study which has reported about females performing better in academics in terms of clinically based performance examinations.<sup>[13]</sup> These differences among medical students can be attributed to different dominant learning styles which are gender specific.<sup>[20]</sup>

In our study, we found gender-based differences among academic performances of different blood group students, with AB positive female students being highest performers, no other study has reported this before; however, one group reports overall performance of AB blood group students is better without any gender difference.<sup>[17]</sup>

## CONCLUSION

Our study reveals that there is no difference in academic performance of students of different blood groups, but many more studies with similar objectives are needed to substantiate the finding. Gender-dependent differences in academic may have blood group-based variations in medical students. Our

study included only medical students so further studies must be focused on students of different streams.

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