

## RESEARCH ARTICLE

### Blood group- and gender-wise comparison of big five models of personality among medical students

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#### ABSTRACT

**Background:** Blood group has been found to associate with different traits, behavioral types as well as proneness to certain diseases. Gender-wise differences in personality and behavior are also likely. **Aim and Objective:** In this study, we have compared personality factors of medical students of different blood groups using big five models of personality. We have also studied gender-wise differences in personality of medical students. **Materials and Methods:** In total, 246 medical students were recruited to participate in this study. Personality traits were assessed by NEO five-factor inventory (NEO-FFI), consisting of five subclasses: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Blood group- and gender-wise comparison of five personality factors were performed using one way ANOVA with *post hoc* Tukey HSD and independent *t*-test, respectively. **Results:** There were no significant differences of personality scores of the big five personality factors among students of different blood groups. Females had a higher score than male participants in agreeableness ( $P = 0.002$ ). Scores of other personality factors were comparable in both groups. **Conclusion:** We conclude that blood group-wise differences in personality factors may not be observed in medical students, but females may be more agreeable than male students.


**KEY WORDS:** NEO Five-Factor Inventory; Big Five Personality Factors; Blood Group; Neuroticism; Extraversion; Openness to Experience; Agreeableness; Conscientiousness

#### INTRODUCTION

The plasma membrane of red blood cell contains many antigens, the most important and best known of these are the A and B antigens. The A and B antigens are inherited as Mendelian dominants, and on the basis of these individuals are categorized into four major blood groups: Type A, Type B, Type AB, and Type O. The ABO antigens are

complex oligosaccharides present in the form of glycoprotein and glycolipids. The presence of Rh antigens adds to further variability and on the basis of presence or absence of Rh antigens, each blood group is classified into two groups: Rh – positive and Rh – negative, respectively.<sup>[1]</sup>

Many studies have been done on ABO blood types and linkage disequilibrium. There are studies which show the association between blood group and occurrence of various disease.<sup>[2]</sup> There are considerable studies which show a definite relationship between blood groups and various diseases such as pancreatic cancer and myocardial infarction.<sup>[3]</sup> There are evidences to suggest that differences in blood group frequency associated with smoking, it was shown that there was no smoking habit in a significant

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group of people with blood type B and AB or smoke infrequently.<sup>[2]</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 disorder are more common in blood Group O, infection preferentially occurs in blood Type A than B, O, and AB blood group individuals. Malaria also has blood group selectivity of A over O. Depressive illness is more common in A and O blood group. Similar stratification of variance in other medical illnesses has been described in conjugation with ABO; hence, there are reasons suggestive of blood groups and their association with other heritable traits.<sup>[4]</sup>

Men and women have been identified differently in terms of their biological roles and play an important but different part in species progression, but their psychological or behavioral differences which may play important roles in determining personality has been controversial and a matter of research. Among genders, psychological differences assessment needs to be objectified and personality inventory may prove an important and useful tool for this.<sup>[5]</sup> NEO- five-factor inventory (FFI) which includes: Neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness is a questionnaire-based big five models of personality score,<sup>[6]</sup> a standardized method of assessment of personality, which has gained popularity in recent years.<sup>[7]</sup>

Hence, in this paper, we have investigated blood group- and gender-wise differences of personality in medical students using NEO-FFI scoring.

## MATERIALS AND METHODS

A cross-sectional study in which 246 medical students of two consecutive batches were screened for the blood grouping and their personality traits were assessed using NEO-FFI.

For the assessment of personality, NEO-FFI was administered to all participants. Participants were instructed to attempt and answer all 60 questions. Scoring of each of five big five personality factors was done separately for each subject. Strongly agree for positive personality factors extraversion, openness, agreeableness, or conscientiousness was given a maximum score (4, four) while strongly disagree for these factors was given minimum score (0, zero). For neuroticism, strongly agree contributed score of 0 (zero) and strongly disagree was given maximum score (4). Sum total of each score was done for each participant.

For blood group detection glass slide method was used, in which a clean glass slide was taken and 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. The mixture was observed for agglutination.<sup>[8]</sup> If agglutination occurred with anti-A serum, indicates that subjects belong to blood type A, and if agglutination occurred with anti-B serum, indicates that subjects have blood type B and blood type O, if there was no agglutination in either case.<sup>[8]</sup>

The study had been approved by the ethical committee and all participants gave written informed consent before entering the study. All those participants who do not fulfill the inclusion criteria such as participants with a history of medical illness, morbidly obese (body mass index  $\geq 35$  kg/m<sup>2</sup>), or those addicted to alcohol or smokers were excluded from the study.

Further, entire students were divided into eight groups, which were comprised of four blood groups from each gender. All statistical analysis was done using SPSS version 22.0. Each NEO-FFI factor of each group was compared by one way-ANOVA with *post hoc* test Tukey HSD. Personality factors were compared between males and females by independent *t*-test.

## RESULTS

Total 246 students (male = 172, female = 74), 55 students had A blood group (50 A +ve and 5 A -ve), 80 students had B blood group (76 B +ve and 4 B -ve), 79 students had AB blood group (77 AB +ve, 2 AB -ve), and 32 students had O blood group (28 O +ve and 4 O -ve).

### Distribution of Participants

More number of male students participated in the study as compared to female and this distribution is primarily because of the gender distribution of students enrolled for MBBS [Figure 1a].

Participants with blood Group B were highest as compared to O and A blood group, [Figure 1b], while the majority of participants were Rh+ blood groups [Figure 1c].

### Big Five Personality Factors of Different Blood Group Participants

Participants with blood type B had the highest neuroticism score compared to other blood types while it was lowest for participants with blood Group A, [Figure 2a]. Those with blood Group B had higher extraversion scores, while it was lowest in participants with O and A blood group [Figure 2b].

Blood Type AB and O had the highest and lowest openness score, respectively [Figure 2c]. For agreeableness, blood type A scored higher than the other blood type while it was lowest in B blood type, [Figure 2d]. Conscientiousness in blood

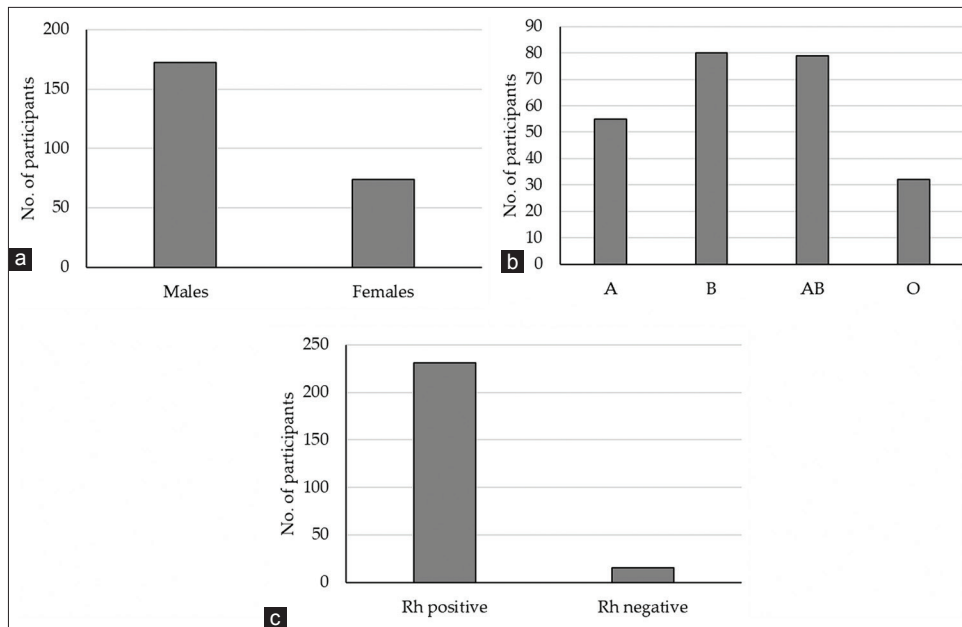


Figure 1: Distribution of the participants according to (a) gender, (b) ABO blood groups, and (c) Rh blood group system

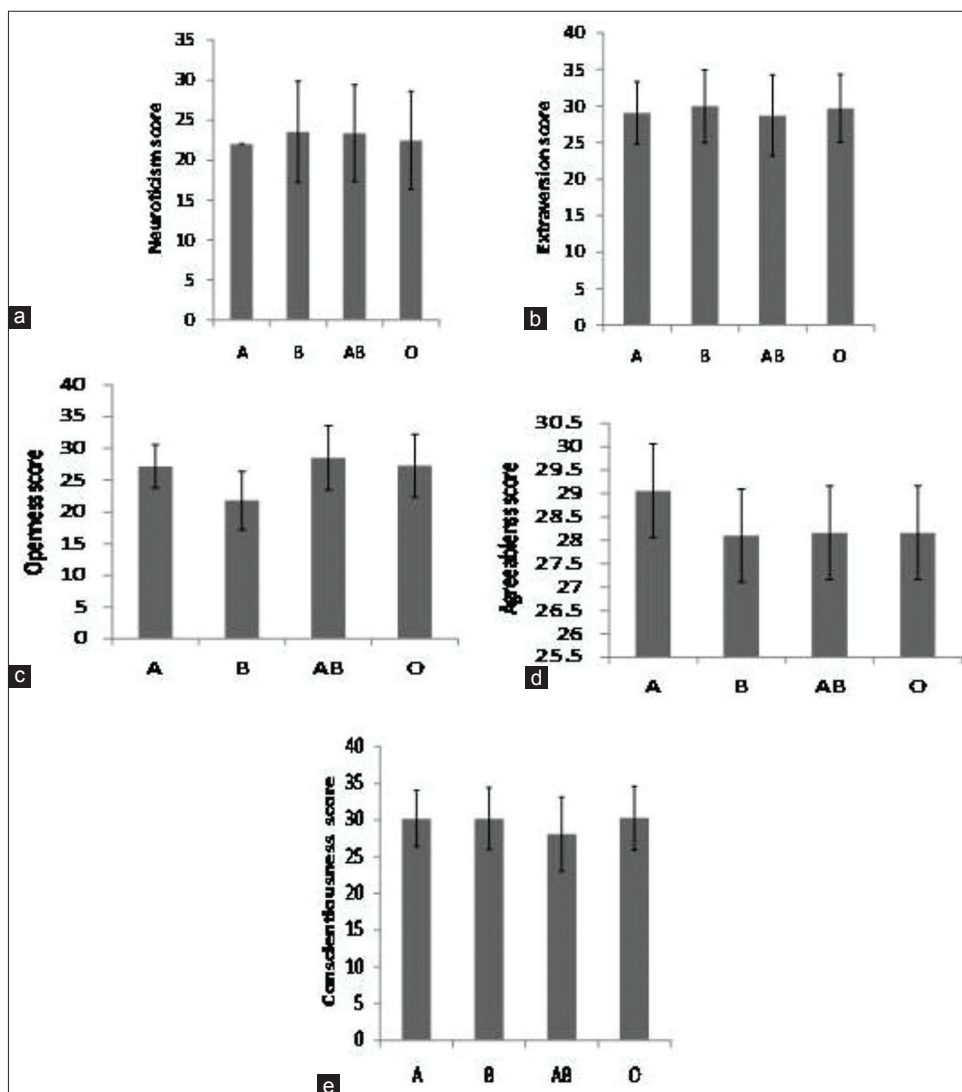
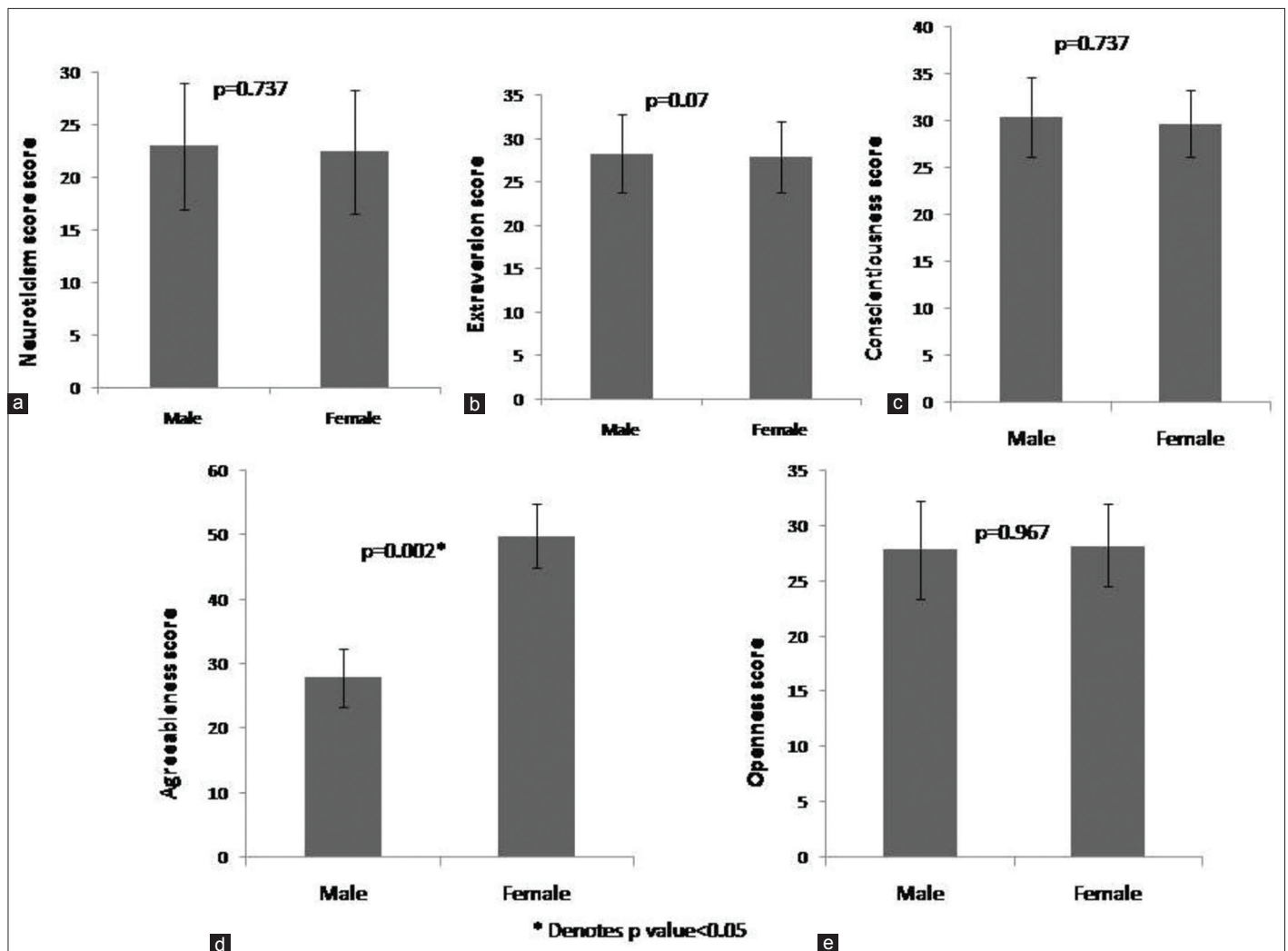


Figure 2: Association of ABO blood group with (a) neuroticism score; (b) extraversion scores; (c) openness score; (d) agreeableness score; and (e) conscientiousness score



**Figure 3:** Association of gender with (a) neuroticism score; (b) extraversion scores; (c) conscientiousness score; (d) agreeableness score; and (e) openness score

type O had the highest score while lowest in blood type AB, [Figure 2e]. Although there was a numerical difference in scores of different personality factors among participants of different blood groups, it fails to achieve statistical significance.

### Gender-based Comparison of Big Five Personality Scores

Neuroticism, extraversion, and conscientiousness scores were higher in male participants, compared to female participants [Figure 3a-e, respectively], while women had the highest score on openness and agreeableness as compared to men [Figure 3c and d, respectively] and agreeableness score were highly significant in females as compared to male [Figure 3 d].

### DISCUSSION

More number of male students participated in the study. The highest number of participants belonged to B followed

by AB blood group. Blood group-wise comparison of personality scores for each factor did not reveal any significant difference among medical students. Females scored significantly higher in “agreeableness” as compared to male participants. Numerical differences were observed in other personality factors, but they were statistically not significant.

To comprehend the relationship between personality and blood types, the big five model of personality has been considered the most accepted and powerful approach.<sup>[7]</sup> Blood group has been observed to associate differentially with personality and character traits. Person’s character is influenced by various factors. The blood group is hereditary and many genes of ABO blood type show association with a personality trait, thus blood identification could be helpful in relating it with the corresponding personality trait.<sup>[9]</sup> Due to its complexity, it is very difficult to know The roots of human behavior and personality.<sup>[10]</sup> The characteristics of blood group with respect to personality are characterized as Type A, B, Type AB, and O.<sup>[11]</sup> On



the other hand, there are certain evidences suggestive of non-conclusiveness of blood group association to character traits.<sup>[4,12]</sup> In our study, we too did not get any significant difference among personality characters and blood types. This may be related to the predictability of personality being related to the socioeconomic status and cognitive abilities of the assessed group.<sup>[13]</sup> Since students participated in the study were of similar age group and were exposed to similar educational and professional environment, it may show the impact of these factors on their personality.<sup>[14]</sup> Although one study has reported that medical students differ in openness, agreeableness, and conscientiousness,<sup>[15]</sup> the study subjects were 5<sup>th</sup>-year medical students, while we recruited 1<sup>st</sup>-year students and we performed blood group-wise comparison.

Gender-specific variations were found, where neuroticism, extraversion, and conscientiousness scores were higher in male students than females, while female students had a higher score than males on agreeableness, indicating women are more credulous and acquiescent than men. This gender difference can be explained in terms of women having interactive and motivational social groups in comparison to men.<sup>[5]</sup> In our study, we observed significant gender differences in agreeableness, where female students scored higher than the males. Similar findings are there to support our observation, where women are had a higher score than men for features suggestive of agreeableness as they were more enhancive, friendly, kind considerate, and helpful.<sup>[15,16]</sup> Neuroticism is primarily related with negative emotions which can be listed as anxiety, fear, anger, jealousy, low mood, guilt, and worthlessness. We did not found any significant difference in neuroticism score, but studies suggest in line with a higher score of neuroticism in female participants than males.<sup>[17]</sup> In our study, we found males scoring higher in extraversion scores than females. Extraversion reflects the enthusiasm and tendency to enjoy human interaction. People scoring high on extraversion are energetic and are talkative.<sup>[18]</sup> Women usually score higher than men on amiability, convivial, and related emotions, while men normally are more decisive and adventurous than women.

The study is among very few to assess the blood group-based differences in personality among medical students and first in India to do so, using the time tested and validated inventory of NEO-FFI models. Gender-wise comparison also substantiated the available limited information. We included only 1<sup>st</sup>-year students as study subjects, though comparison with senior batch students might have given some insights regarding professional experience and its impact on personality as the duration of work experience has an important impact on personality.<sup>[19]</sup> Assessment of socioeconomic status, physical activity, and cognition would

have been helpful in the understanding of the observed findings.

## CONCLUSION

This study concludes that there is no considerable difference among personality scores of individuals of different blood groups, but at the same time, gender base personality differences are fairly evident indicated here as female medical students being more agreeable in comparison to males.

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