Blood Groups, BT and CT in Medical and Para Medical Students-Gender Based Distribution and Their Relation. An Observational Study.

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ABSTRACT:
Background: Evaluation of blood groups, bleeding and clotting time are the most important and initial hematological parameters done routinely and especially before any surgical procedure. Researches indicate that various gastrointestinal diseases like ulcers, cancers, UTIs, cardiovascular disorder, diabetes mellitus as well as thrombosis, epistaxis etc. are associated with ABO blood group system. Hemostatic parameters like BT and CT also vary in different blood groups.

Materials and methods: The available data of 400 students of 1st year of mbbs, bds and para medical courses was analyzed in every required aspects i.e. sex, age, ABO and Rh blood groups, bleeding and clotting times. The standard antisera (A, B, & D) was used to determine the blood group, Duke’s Method and Capillary tube method were used to find out bleeding and clotting time respectively. Finally, all the parameters were compared and analyzed statistically.

Results: Blood group B (44.5%) was the most common blood group in both genders followed by O (30.5%), A (21%), and AB (4%). Bleeding time was found to be prolonged >4 min in maximum number of group O (53%) followed by group A (26.4%), group B (14.2%), and then group AB(6.1%) but the difference was statistically significant (p = 0.00005). Similarly clotting time was >6 min in group O(54.5%) followed by group B=A(18.1%), group least in AB (9%), but the difference was statistically significant (p = 0.19). Gender-wise bleeding time was more prolonged in females (67.3%) than males (32.6%) but the difference was statistically insignificant (p = 0.07), similarly clotting time too was prolonged more in females (81%) than males (18.2%) but again the difference was statistically significant (p = 0.04).

Conclusion: In our study, blood group B predominated followed by O, A, and AB. Bleeding time was prolonged >4 min in blood group O followed by A, B, and AB whereas clotting time was prolonged >6 min in blood group O followed by A=B and then AB. Gender-wise bleeding and clotting time were higher in females than males.

Various blood related disorders, cardiovascular and gastrointestinal diseases are associated with blood groups, so people can take preventive measures according to their blood groups.

Key words; Blood grouping, bleeding time, clotting time.

INTRODUCTION

Evaluation of blood groups, bleeding and clotting time are the most important and initial hematological parameters done routinely and especially before any surgical procedure. The ABO and Rh blood group system remains so far the most significant in blood transfusion. The magnificent discovery of ABO blood group system is credited to Austrian scientist Karl Landsteiner in 19001. He discovered three blood groups (A, B & O) for which he was awarded Nobel Prize in 1930. Fourth blood group AB was discovered by Alfred Von Decastello and Adriano Sturli in 1902². Blood group antigens are inherited as Mendelian determinants. The individuals are divided into four major blood types on this basis. Type A individuals have the antigen A, type B have antigen B, type AB have both and type O have neither of these antigens. These A and B antigens are complex oligosaccharides that differ in their terminal sugar³.

The ABO blood group system influences the bleeding time (BT) and clotting time (CT). BT is the time interval between the skin puncture and spontaneous unassisted stoppage of bleeding. CT is the time interval between the puncture of blood vessels and formation of fibrin threads⁴.

Stoppage of bleeding from damaged blood vessels is hemostasis, an essential factor to be checked before any surgical process. Hemostasis consists of two phases, one is a vascular (platelet) phase and the other is coagulation phase. The activity of first phase can be checked by using the parameters like bleeding time, platelet count and platelet function assay⁵. The bleeding time as a screening test for evaluation of platelet function. While the available test to check the second phase (Coagulation phase) include clotting time (whole blood), prothrombin time, plasma fibrinogen and activated plasma thromboplastin time. Some diseases are also having relation with blood groups⁶.
AIMS AND OBJECTIVE: The aim of this study was to evaluate blood group distribution among male and female students and to compare bleeding and clotting time among various blood groups, and also to identify the gender difference among the same, if any.

DATA COLLECTION AND PROJECT DESIGN: The study was done during sep. 2017 and jan. 2018 in Department of Physiology, Government medical college Srinagar. A pre-designed questionnaire was used to collect the information from the students regarding their age, gender, blood group, bleeding time and clotting time after taking informed consent. Blood grouping, bleeding time and clotting time is done by the students as a part of their physiology practical work in hematology laboratory of the department. Students having any bleeding/clotting time disorders or drug intake (NSAIDS) were not included in this study to avoid bias.

Material And Methods: Our study included 400 students of same age group who participated in our study (17–20 years), all students belonged to first year of mbbs ,bds and para medical courses. Students having any missing study variable were omitted from the study. The presented data of 400 students was analyzed.

Procedure for blood grouping and rhesus factor (Rh factor) : Blood groups were determined by using standard antisera during physiology practical time in a hematology laboratory. Sterile lancet was used to prick the finger after sterilizing the puncture site with spirit. A blood sample was taken on glass slides and mixed with anti-sera A, B and D, and presence or absence of agglutination was checked to determine the blood group and Rh status. The low-power objective of a compound microscope was used to confirm the agglutination.

Procedure for doing Bleeding Time: Duke’s filter paper method was used to determine the bleeding time. A deep skin puncture of the finger (preferably middle or index finger) was made and the time period required to stop the bleeding from incision was recorded every 30 sec using blotting paper. Bleeding time was calculated by multiplying the number of drops on the filter paper with time (30 sec). The normal values of BT by Duke’s filter paper method generally lie in the range of 1–5 min.

Procedure for doing Clotting time
Capillary tube method was used to find out the clotting time. A skin puncture was made and the first drop was wiped away. A special capillary tube was filled with blood and time was noted when the blood first appeared in the capillary. The tube was held between the thumb and index finger of both hands, and the time taken to clot the blood was counted by gently breaking the tube every 30 sec, 1-2 cm from the end, until the formation of fibrin thread across the gap between the ends of the tube. The normal Clotting Time valued by the method ranges between 5–11 min.7

Statistical Analysis

The available data was expressed in frequency table to find out the sex ratio and to compare different ABO blood groups. Statistical analysis was carried out using SPSS version 16 (SPSS Inc., Chicago, IL). The chi-square test was applied to examine relation between blood groups, BT, and CT; p-value of 0.05 was considered to be statistically significant.

RESULTS

The available data of 400 students was analyzed. Out of 400 students 176 were males and 224 were females. The age group was homogeneous in our study population (17–20 years). It was found that the predominant blood group in current study was blood group B followed by O then A and least common AB.

Most of subjects having more than 6 minutes clotting time were in O blood group in comparison to other groups of ABO system (p = 0.04) which was statistically significant. Most of subjects having more than 4 minutes bleeding time were also in O blood group in comparison to other groups of ABO system but was statistically significant (p = 0.00005). Clotting time and bleeding time were both prolonged in females in comparison to males was statistically significant (p= 0.04) while as bleeding time was statistically insignificant (p=0.07).

Female individuals having comparatively more bleeding time and clotting time may be due to the presence of hormone estrogen, which lowers the plasma level of fibrinogen and increase the clotting time.

Table 1. Number and percentage distribution of various blood groups in medical students

<table>
<thead>
<tr>
<th>Blood group</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>33 (19.6%)</td>
<td>51 (21.9%)</td>
<td>84 (21%)</td>
</tr>
<tr>
<td>B</td>
<td>76 (45.2%)</td>
<td>102 (43.9%)</td>
<td>178 (44.5%)</td>
</tr>
<tr>
<td>O</td>
<td>50 (29.7%)</td>
<td>72 (0.3%)</td>
<td>122 (30.5%)</td>
</tr>
<tr>
<td>AB</td>
<td>9 (0.05%)</td>
<td>7 (0.3%)</td>
<td>16 (4%)</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>232</td>
<td>400</td>
</tr>
</tbody>
</table>

Table 2. Showing gender based distribution of bleeding time below and above 4 mins in various Blood groups.

<table>
<thead>
<tr>
<th>Blood groups</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>36(19)</td>
<td>43(21.1)</td>
<td>79(20.2)</td>
</tr>
<tr>
<td>B</td>
<td>74(48.6)</td>
<td>97(48.7)</td>
<td>171(48)</td>
</tr>
<tr>
<td>O</td>
<td>41(26.5)</td>
<td>55(27.6)</td>
<td>96(27.3)</td>
</tr>
<tr>
<td>AB</td>
<td>8(5.2)</td>
<td>50(25)</td>
<td>58(16.5)</td>
</tr>
<tr>
<td>Total</td>
<td>155</td>
<td>199</td>
<td>354</td>
</tr>
</tbody>
</table>

Table3. Showing gender based distribution of Clotting time below and above 6 mins in various Blood group
A clear correlation has been established between the ABO phenotype and the level of two proteins in blood clotting, i.e., factor VIII and von Willebrand factor (vWF). Individuals with blood group O have about 25% less factor VIII and vWF in their plasma, thus increasing their clotting time and may cause excessive bleeding. As stated by Massimo Franchini et al., relationship between ABO blood group and von Willbrand factor levels: from biology to clinical implications. to the type O group, the non-O group individuals can have an increased risk of thrombosis due to the higher levels of vWF. He also stated that the ABO blood group can affect the vWF catabolism. Recent researches indicate that diabetes mellitus, various gastrointestinal diseases like ulcers, cancers, UTIs, as well as thrombosis are associated with ABO blood group system.

The commonest type of blood group in our study was B followed by O and A and least common was AB. The same trend of prevalence of blood groups B > O > A > AB was observed by Patil SV et al. and various other researchers. In contrast to our study, results obtained from a study conducted on 322 medical students by Pramanik T, Saikia TC and Bandopadhyaya M, and Bedanta et al. also reveals that the Nepalese students had predominant blood group O (35.2%), followed by A (30.5%), B (28.9%) and AB (5.5%). which reported blood group O as the most prevalent one (32%), followed by A (29%), B (26%) and AB (13%).

In the present study, Clotting time and bleeding time both are prolonged in blood group O which was statistically significant (p=0.19) and (p=0.00005) respectively. In contrast to our study non significant prolonged BT was seen in blood group O in a study done by Thenmozhi S, Neelambikai N, Aruna P. Similar to our study, BT was found more prolonged in the blood group AB compared to other groups, which was statistically significant.

The comparison of gender with bleeding and clotting times in our study shows that females have greater values of BT and CT as compared to males which was statistically significant (p=0.04). This gender based difference might be because of higher levels of estrogen and lower levels of fibrinogen in blood plasma of females compared to males.

In contrast to our study, there was no such gender-wise difference in BT and CT in a study carried out by Mahapatra and Mishra.

Conclusion

Blood group B was the most common blood group among the students and AB was the least common blood group. CT was prolonged >6 min among blood group O > A and B=AB, in females while as in males 0>B=A>AB. Hence CT was more prolonged in blood group O in both males and females and was statistically significant.

BT was prolonged >4 min in blood group O and least in AB in both genders which was statistically significant.

Gender-wise BT and CT were higher in females than males, but the difference was statistically significant.

Further research with larger sample size and conduct of multicentric studies are necessary to confirm these finding of different ABO blood groups and also the plasma von Willebrand factor and estrogen levels should be estimated to rule out any possible reason for the different levels of clotting and bleeding time among the ABO groups. This will help us to identify the risk group and preventive measures could be adopted before the onset of such disorders.

Acknowledgement

Thanks to all students who participated in this study.

Bibliography