

A STUDY TO FIND OUT ASSOCIATION BETWEEN BLOOD GROUP AND COMPLETE HEMOGRAM

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Abstracts: Background & objectives: Numerous studies shows that certain types of diseases are more common in certain blood groups like tuberculosis is more common in type O, plasmodium vivax infection is more common in type A and O blood group. It may be possible due to genetic predisposition and immunological response in certain blood groups than others. This study also wants to find any association of hemogram parameters with various blood group types. **Methods:** 51 cases in time span of 1 month have been included in this study. Prior information sheet was provided to subjects about this study. On voluntary consent, subjects' 0.5ml venous blood was collected aseptically and hemogram parameters like Hb, RBC count, PCV, MCV, MCH, MCHC, TLC and RDW-CV were measured using Auto analyser instrument. All healthy male and female subjects above 18 years were included in study. Data analysis was done by MedCalc v18.6 and single factor ANOVA was applied for various hemogram parameters. **Results:** Out of 51 cases, majority are A+ve and B+ve blood group with 16 cases each. O-ve and B -ve blood group types had more RBC count (4.52 ± 0.85 & 4.52 ± 0.69 respectively) compared to other blood group types. AB+ve were found to have more TLC (9100) compared to other blood types. **Interpretation & conclusion:** Out of 51 cases, 47 have Rh positive and 4 are Rh negative. On applying single factor ANOVA for finding association between blood group types and RBC count, p value was found to be 0.210. Similarly for finding association between TLC and blood group types, p value was at 0.563. Thus no association was found between blood group type and TLC or RBC count. Similar findings were observed for rest of hemogram parameters.

Key Words: Blood group types, ABO & Rh, Complete Hemogram

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Introduction:

ABO blood group was discovered by Karl Landsteiner in 1901 AD¹. There are numerous studies which shows that certain types of diseases are more common in certain blood group types like type O have higher chances of tuberculosis, type A and O have higher chances of plasmodium vivax (Malaria parasite) infections and type B have higher chances of plasmodium falciparum (another malaria parasite) infections². Thus, it's quite evident that certain blood groups have certain diseases more commonly than others. It may be associated with genetic predisposition or it may be even immunological reactions which different individual with different blood groups have against certain diseases. Now blood group type may have genetic predisposition or immunological influence on number of RBC, WBC and platelets³. To find any association of blood group and various hemogram values this study is conducted. It may indicate the possibility of anemia, infections or thrombocytopenia in certain blood group individuals.

Material and Methods:

In total 51 cases are included in span of 1 month from start of study. Prior IEC approval was taken for this study. Healthy individuals were given information sheet about present study detailing all procedures and aims & objectives of present study. Basic questions about any known infections, anemia or any thrombocytopenic diseases was asked and noted down.

Subjects were informed about procedure and risk and benefit of study and were included in study only if given voluntary consent. Blood sample of 0.5 ml was collected in completely sterilized and standard universal protocol. This blood sample was passed through auto analyzer in which tests like Hemoglobin estimation, RBC count, WBC count, Differential Count, MCV, MCH & MCHC was be done. Also, Blood group type i.e. ABO and Rh was analyzed to know blood group of the individual.

All healthy male and female subjects and all age (above 18) group individuals are included in present study. Persons not willing to give consent are excluded. All teaching staff, post graduates and under graduates of Shri M. P. Shah medical college, Jamnagar have been excluded.

Quantitative data was analyzed by single factor ANOVA using MedCalc v18.6. $p > 0.05$ is considered as not significant. $p < 0.05$ is considered as significant. $p < 0.001$ is considered as highly significant.

Result: In present study, following table shows number of cases distributed in ABO and Rh blood group system.

| Blood Groups | Number of Cases |
|--------------|-----------------|
| | |

| | |
|--------------|-----------|
| A +ve | 16 |
| B +ve | 16 |
| B -ve | 2 |
| AB +ve | 7 |
| O+ve | 8 |
| O -ve | 2 |
| Total | 51 |

Table 1: Distribution of ABO & Rh blood group types

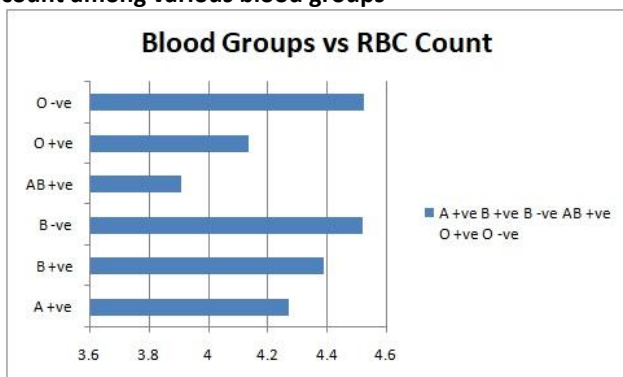
The above table shows that majority of cases are of A +ve and B +ve blood group types with each having 16 subjects. While least number of subjects was in B -ve and O -ve group each having 2 individuals.

In present study, mean Hb and standard deviation of A +ve blood group is 12.11 gm% ± 1.388 gm%. Similarly for B +ve blood group, mean Hb and its standard deviation are 12.45 gm% ± 2.131 gm%. Also, for B -ve its 13.1±4.10 gm% and O -ve its 11.7±4.24 gm% and O+ve its 11.17±1.23 gm%.

In present study, mean RBCs count (in millions/cumm) and standard deviation of A +ve blood group is 4.27±0.45. Same way mean RBCs count and standard deviation of B +ve blood group is 4.39±0.49 and for B-ve blood group 4.52 ± 0.69 and for AB+ve blood group 3.90±0.37 and for O +ve blood group 4.13±0.28 and for O-ve blood group is 4.52±0.85. Applying single factor ANOVA in MedCalc v18.6 various blood group system gives p value at 0.210.

| Blood group | Mean RBCs (millions per cumm) | Standard deviation |
|-------------|-------------------------------|--------------------|
| A +ve | 4.27 | 0.4523 |
| B +ve | 4.39 | 0.4978 |
| B -ve | 4.52 | 0.6930 |
| AB +ve | 3.90 | 0.3790 |
| O +ve | 4.13 | 0.282 |
| O -ve | 4.52 | 0.855 |

Table 2: Distribution of mean and standard deviation of RBCs count among various blood groups



Graph 1: Distribution of RBC count in various blood group types

In present study, mean and standard deviation of PCV of A +ve blood group is 34.96% ± 3.92%. Same way mean and standard deviation of PCV of B +ve blood group is 35.37% ± 4.95% and for B-ve blood group 37±69.92% and for AB+ve blood group 32.25% ± 5.50% and for O +ve blood group 32.93% ±3.79% and for O -ve blood group is 34.30±8.91%.

In present study, mean and standard deviation of MCV of A +ve blood group is 82.04±7.16 cuµ. Same way mean and standard deviation of MCV of B +ve blood group is 80.70±7.76 cuµ and for B-ve blood group 81.40±5.98 cuµ and for AB +ve blood group 82.45±10.33 cuµ and for O +ve blood group 79.68±7.46 cuµ and for O -ve blood group is 75.28±5.45 cuµ.

In present study, mean and standard deviation of MCH of A+ve blood group is 28.85±2.60 pg. Same way mean and standard deviation of MCH of B +ve blood group is 28.39± 3.53pg and for B-ve blood group 28.62± 4.69pg and for AB+ve blood group 29.39± 3.79pg and for O +ve blood group 27.06±2.77pg and for O -ve blood group is 25.42±4.57pg.

In present study, mean and standard deviation of MCHC of A+ve blood group is 35.27 ± 3.21%. Same way mean and standard deviation of MCHC of B +ve blood group is 35.13 ± 2.05% and for B-ve blood group 35.05 ± 3.18% and for AB+ve blood group 35.64 ± 1.12% and for O +ve blood group 33.95 ± 1.14% and for O -ve blood group is 33.64 ± 3.63%.

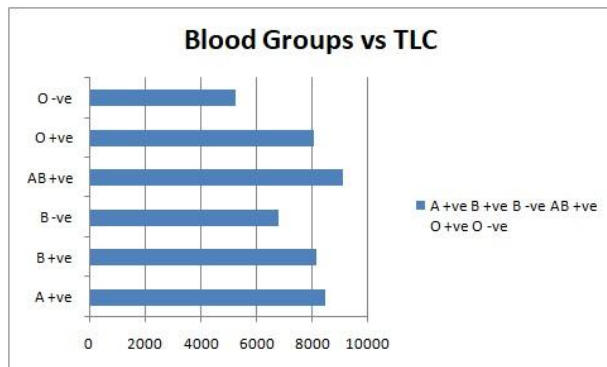
In present study, mean and standard deviation of TLC (in cells/cumm) of A +ve blood group is 8444±2814.47. Same way mean and standard deviation of TLC of B+ve blood group is 8150±3235.01 and for B-ve blood group 6800±1131.37 and for AB+ve blood group 9100±2119.74 and for O+ve blood group 8050±1540.87 and for O-ve blood group is 5250±494.97. Applying single factor ANOVA using MedCalc v18.6 gives p value at 0.563.

| Blood group | Mean TLC (per cumm) | Standard deviation |
|-------------|---------------------|--------------------|
| A +ve | 8444 | 2814.47 |
| B +ve | 8150 | 3235.01 |
| B -ve | 6800 | 1131.37 |
| AB +ve | 9100 | 2119.74 |
| O +ve | 8050 | 1540.87 |
| O -ve | 5250 | 494.97 |

Table 3: Distribution of mean TLC and its standard deviation in various blood groups

In present study, mean and standard deviation of RDW (Red Cell Distribution Width) respectively for A +ve blood group are 12.36 ± 1.39%, for B +ve blood group are 12.46 ± 1.61%, for B -

ve blood group are $11.30 \pm 0.99\%$, for AB+ve blood group $12.95 \pm 1.62\%$, for O+ve blood group $12.63 \pm 1.06\%$ and O-ve blood group $12.40 \pm 4.24\%$.



Graph 2: Distribution of TLC in various blood group types

Discussion:

In present study, out of 51 subjects 47 are Rh positive and only 4 are Rh negative. Out of 47 Rh positive, 38 subjects were females and 9 subjects were male. Out 4 Rh negative subjects, 3 were female and 1 was male.

In our cross sectional analytic study 41 subjects were female and 10 were male subjects. Out of 41 female, 10 were A+ve, 14 were B+ve, 6 were AB+ve and 8 were O+ve. Out of 10 males, 6 were A+ve, 2 were B+ve, and 1 was AB + ve and no one in O+ve blood group.

Mean Hb of female subjects was 11.56 gm% with standard deviation of 1.46 gm%. While in male subjects mean Hb was 13.85 gm% and standard deviation was 2.46 gm%.

In present study, Rh negative subjects with Hb less than 12 gm% were 3.9% and more than 12 gm% were also 3.9%. While Rh positive subjects with Hb less than 12 gm% were 50.98% and more than 12 gm% were 41.18%. In Jay Prakash Sah et al study⁶, Rh negative subjects with Hb less than 12 gm% were 0.3% and more than 12 gm% were 1.1%. Also in same study Rh positive subjects with Hb less than 12 gm% were 13.9% and more than 12 gm% were 84.7%

In our study, mean RBC count (in millions/cumm) for A blood group was 4.27 and standard deviation was 0.45. While in Shantanu Sharma et al⁴, for A blood group mean and standard deviation of RBC count was 3.59 ± 2.33 . Similarly, for B blood group mean and SD for RBC count was 4.46 ± 0.59 and for O blood group mean and SD was for RBC count was 4.34 ± 0.57 and for AB blood group mean and SD for RBC count was 3.90 ± 0.37 . While in Shantanu Sharma et al, for B blood group mean and SD for RBC count was 3.71 ± 2.47 , for O blood group mean and SD for RBC count was 3.78 ± 2.91 , for AB blood group mean and SD for RBC count was 4.01 ± 3.21 . While in Akshaya P. Sahastrabuddhe et al⁵, for B blood group mean of RBC count was 4.31 and for AB blood group mean RBC count was 4.4. p value of single factor ANOVA in RBC count being 0.218

indicates that there is no association between RBC count and blood group types.

In Akshaya P. Sahastrabuddhe et al study⁵, mean TLC (in cells/cumm) of B -ve blood group were 7500, B+ve blood group were 12600 and AB+ve blood group were 7300. While in our study, mean TLC of B -ve were 6800, B+ve were 8150 and AB+ve were 9100. In our study while applying single factor ANOVA in MedCalc v18.6 p value of TLC was 0.563. Thus we can say that there is no association between Total leukocyte count and blood group type.

Similarly, for other hemogram values applying single factor ANOVA using MedCalc software, p value for PCV is 0.607, for MCV is 0.868, for MCH is 0.550, for MCHC is 0.709 and lastly for RDW-CV is 0.852. Thus in all p value is greater than 0.05 indicating that there is no association between various hemogram parameters and blood group type.

Conclusion:

So we can conclude that in our study, out of 51 subjects majority were in A +ve and B +ve blood group type each containing 31.37% (in total 62.74%). Least amount of subjects were of O-ve and B -ve type each containing 3.92%. In conclusion to all hemogram parameters like Hb estimation, RBC count, PCV, MCV, MCH, MCHC, TLC and RDW-CV, p value using single factor ANOVA in MedCalc v18.6 was found to be more than 0.05 in all parameters of hemogram in association with blood group types. So we can conclude that there is no association between various hemogram parameters and blood group types. However, being limited sample size in our study, further research with larger sample could give more confirmatory results.

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