



“ASSOCIATION OF ABO & RH BLOOD GROUPS WITH HEPATITIS, HIV AND SYPHILIS INFECTIONS IN HEALTHY BLOOD DONORS AT TERTIARY CARE CENTRE”.

Pathology

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ABSTRACT

Background: People from certain blood groups are more prone to develop infections transmitted by blood transfusion. In order to improve the management of such infections some hypothesis suggests that genetic predispositions like ABO and Rh blood groups would influence the occurrence of such infections. Hence the present study aims to assess any possible associations of ABO & Rh blood groups with Hepatitis, HIV & syphilis infections in healthy blood donors. **Methods:** This was a retrospective study in healthy blood donors of tertiary care hospital enrolled during years 2016 to 2020. Blood samples from total 34015 donors were screened for blood grouping & serology of HIV, Hepatitis & Syphilis. **Result:** Out of total donors only 171 donors were found positive for transfusion transmitted infections. Hepatitis B virus was found more prevalent compared to other infections. In ABO blood group type “B” and in Rh blood group type “Positive” was found more prevalent in donors. But it did not show any significant association with transfusion transmitted infections. **Conclusion:** High prevalence of HBV infections in blood donors in present study point towards need of public health measures in general population. Undertaking further research to determine the special blood groups as increased risk for categorized donors is recommended.

KEYWORDS

Blood group, Transfusion transmitted infections, blood donors.

INTRODUCTION:

Transfusion transmitted infections are among the most commonly encountered serious complications in transfusion practice. Every year millions of blood and its products are transfused across the world. Transfusion Transmitted Infections (TTI) especially hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV) always pose threat to blood transfusion services.^[1] It has been shown that ABO blood groups have some connections with a variety of infectious and non-infectious diseases along with susceptibility to some infections. Few blood groups can act as a receptor and ligand for certain bacteria, parasites and viruses. The probable mechanism for this vulnerability is that blood group antigens are glycoproteins and glycolipids which are highly charged molecules. These molecules destined to affect their molecular microenvironment which brings change in protein conformation, over expression of receptors and thus increased susceptibility to microbial infections.^[2, 3] Study of the possible relationship existing between blood groups and blood borne diseases has been attracted much attention in recent years. There are evidences suggesting that blood groups play a role in proneness to diseases such as stomach ulcer, stomach cancer, coronary artery disease, venous thromboembolism, endocrine tumors in men, and epithelial ovarian^[4,5].

Several studies have been conducted to find out associations between ABO and Rh blood groups to various blood borne infections but the results have been variable.^[6] Hence, the aim of this study was to estimate the frequency of Hepatitis B, Hepatitis C, HIV and syphilis in healthy blood donors in a tertiary care centre and to find out any possible association between blood groups and blood borne infections.

MATERIAL AND METHODS

It was a retrospective study carried out at A.D. Gorwala blood Bank associated with a tertiary care centre, Shree Krishna Hospital, Karamsad, Anand, Gujarat. A total of 34015 healthy blood donors enrolled from January 2016 to December 2020 were included in this study for analysis maintaining confidentiality of all the donors after the approval from Institutional Human Research Ethics Committee.

All donors were selected and screened for Hepatitis B, Hepatitis C, HIV & Syphilis as per the criteria set by drugs and cosmetic act, Government of India.^[7] The demographic details like donor's age, gender, category of blood donation (voluntary or replacement) and history of past donation were recorded.

ABO and Rh blood groups were determined by using forward & reverse blood group method and Du test using ERYSCREEN@reagent

combipack from Tulip diagnostic private LTD.

Blood samples were analyzed for presence of HIV 1 and 2 (4th generation, Qualisa, Tulip diagnostics), hepatitis B surface antigen (HBsAg, 3rd generation, Qualisa, Tulip diagnostics), anti-HCV (3rd generation, Qualisa, Tulip diagnostics) by ELISA method. Syphilis test was performed by dip stick method (syphicheck, Tulip diagnostics).

Statistical Analysis:

Statistical analysis was done by entering the data into Microsoft office excels worksheet. Categorical variables were represented as frequency and percentage to calculate the prevalence of TTIs with respect to blood group. Analyses were performed by using SPSS (Statistical Package of Social Sciences) version 23.0.

RESULT

A total of 34015 healthy donors were registered from year 2016 to 2020. Out of these a total 170 donors were found reactive to transfusion transmitted infections studied and the rest 33845 donors were found nonreactive.

As Shown in Table 1, Maximum numbers of donors (7608) were registered in the year of 2019 compared to that of other years. Infection of Hepatitis B virus were found more prevalent (76 cases) followed by that of HIV (50 cases) compared to the other infections studied.

Table 1: Year Wise Distribution Of Transfusion Transmitted Infections.

Year	HIV (%)	Hepatitis C (%)	Hepatitis B (%)	Syphilis (%)	Total Reactive	Total Non Reactive	Total
2016	21 (0.32%)	02 (0.030%)	18 (0.27%)	04 (0.064%)	45 (0.69%)	6417	6462
2017	08 (0.11%)	04 (0.057%)	15 (0.21%)	01 (0.014%)	28 (0.40%)	6965	6993
2018	05 (0.072%)	04 (0.057%)	13 (0.18%)	10 (0.14%)	32 (0.46%)	6882	6914
2019	12 (0.15%)	03 (0.039%)	19 (0.24%)	11 (0.14%)	45 (0.59%)	7563	7608

2020	04 (0.066)	02 (0.033%)	11 (0.18%)	03 (0.049%)	20 (0.33%)	6018	6038
Total	50 (0.14%)	15 (0.044%)	76 (0.22%)	29 (0.085%)	170 (0.49%)	33845	34015

Gender wise distribution among transfusion transmitted infections is shown in Table 2. Out of total 170 seropositive donors, 166 donors were male and only 5 donors were female. But the present study did not found any statistically significant association between gender and transfusion transmitted infections. As Shown in Table 3, 52.7% donors within the age group of 18-27 years followed by 39.3% donors within the age group of 28-37 found reactive to hepatitis B virus. But it did not show any significant relation between age groups and transfusion transmitted infections.

Table 2: Frequency Distribution Of Gender Among Transfusion Transmitted Infections.

Gender	HIV (%)	Hepatitis C (%)	Hepatitis B (%)	Syphilis (%)	Total
Male	47 (27.6%)	15 (8.8%)	74 (43.5%)	29 (17.05%)	165 (97.05%)
Female	3 (1.76%)	0	2 (1.17%)	0	5 (2.94%)
Total	50 (29.2%)	15 (8.8%)	76 (44.7%)	29 (17.05%)	170

Table 3: Age Wise Distribution Among Transfusion Transmitted Infections.

Age	HIV(%)	Hepatitis C(%)	Hepatitis B(%)	Syphilis(%)	Total
18-27	15 (27.3%)	3 (5.5%)	29 (52.7%)	7 (12.7%)	54
28-37	16 (28.6%)	8 (14.3%)	22 (39.3%)	10 (17.9%)	56
38-47	15 (31.9%)	2 (4.25%)	19 (40.4%)	11 (23.4%)	47
48-57	03 (27.3%)	2 (18.2%)	5 (45.5%)	1 (9.1%)	11
58-67	01 (50.0%)	00	1 (50.0%)	00	02
Total	50 (29.21%)	15 (8.8%)	76 (44.4%)	29 (17.0%)	170

As shown in Table 4, ABO blood group "B" was found more prevalent (36 donors) followed by blood group "O" (21 donors) from the total 170 donors and Rh Positive donors were found more frequent reactive to transfusion transmitted infections which also did not show any significant association between blood group and infections.

Table 4: Frequency Distribution Of ABO & Rh Blood Groups With Transfusion Transmitted Infections.

Blood groups	HIV(%)	Hepatitis C (%)	Hepatitis B (%)	Syphilis (%)	Total
A positive	09 (25.7%)	05 (14.3%)	15 (42.9%)	06 (17.1%)	35
A negative	0	0	01 (33.3%)	02 (66.7%)	3
B positive	19 (31.1%)	02 (3.3%)	33 (54.1%)	07 (11.5%)	61
B negative	0	0	03 (75.0%)	01 (25.0%)	4
AB positive	02 (28.6%)	01 (14.3%)	03 (42.9%)	01 (14.3%)	7
AB negative	0	0	0	0	0
O positive	18 (31.0%)	07 (12.1%)	21 (36.2%)	11 (19.0%)	57
O negative	02 (66.7%)	0	0	01 (33.3%)	3
Total	50	15	76	29	170

DISCUSSION

Multiple forms of studies have been performed to identify association of ABO and Rh blood groups with transfusion transmitted infections and various diseases. According to present study the most frequent blood group was B positive followed by O positive. The most frequent transfusion transmitted infection was Hepatitis B followed by HIV, Syphilis and Hepatitis C.

In India blood group distribution has a lot of diversity. Therefore, it is essential to have knowledge on frequency of ABO blood groups in particular region in determining the course prevalence of TTIs. Many studies have been done to explore association of ABO and Rh blood group and risk of TTIs; but the results obtained from such studies are contradictory. This is because such studies have adopted different sample size, different screening methods and different social and geographical factors. Few studies observed higher seroprevalence of HBV, HCV and HIV, among O positive blood group.^[8,9] However, studies with large sample size did not find any statistically significant

association between ABO blood groups and hepatitis B, and between ABO blood groups and HIV infection.^[10-12] Similarly, in present study, no statistically significant association was observed between risk of acquiring HBV, HIV and HCV infection and any of the above blood groups.

The seropositivity of syphilis (0.085%) was lower as compared to other studies by Makroo et al. and Kaur et al. who found a prevalence of 0.23% and 0.7% respectively.^[12,13] The higher prevalence of syphilis observed in other studies could be because of testing with non treponemal tests which gives rise to biological false positive reactions. Nonspecific antigens used in non treponemal test cross react in conditions like autoimmune diseases, viral infections, pregnancy and malignant neoplasm.^[14]

The present study observed higher prevalence of Hepatitis B virus infections in blood donors within the age of 18-37 years which in favour with the study by Patil AV et al.,^[15] and Rodenas JG et al.,^[16] who reported the higher prevalence of Hepatitis B virus in donors older than 38 years of age. This has been explained on the basis of increased exposure to this virus with age. In the younger age group the less prevalence may be due to the vaccination program implemented in certain countries.

The frequencies of all transfusion transmitted infections are low in females but this may just be a biased statement because the number of female blood donors was very low as compared to the male blood donors. Relationships of blood groups have been studied in relation to gastric cancer and found more in A positive patients.^[17] Associations of ABO blood groups have been studied with oral cavity squamous cell carcinoma.^[18] The prevalence of certain CVS diseases, thrombotic disorders and certain malignancies has been seen to be associated with non-O blood groups in a variety of studies.^[19-22] According to our study there was an increasing trend in Hepatitis B, C and syphilis, which is an alarming issue despite the introduction of Hepatitis B vaccine.

CONCLUSION

The present study found no association between ABO and Rh blood groups and transfusion transmitted infections. However, the highest frequency of infected blood donors was observed in ABO blood group B and Rh Positive. It would be advisable to conduct further studies to confirm the link between these two parameters & to identify the mechanisms by which ABO & Rh antigens may influence the occurrence of such infections, and also to contribute to the search for new therapeutic approaches. Furthermore, the high frequency of hepatitis B observed in our study could be lowered by raising awareness of vaccination against hepatitis B among blood donors.

Declaration:

The author(s) insure that no contractual relations or proprietary considerations exist that would affect the publication of information in the submitted manuscript. There is no conflict of interest of any sort. Neither has the membership nor one with substantially similar content under my authorship been published in any language, in any journal nor is being considered for publication elsewhere.

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