

Hepatitis C Virus Infection and ABO Blood Group Assessment: Tertiary Hospital Study in India

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Abstract

People with certain blood groups and Rh positive are more prone to infections transmitted by blood transfusion. The aim of this research was to survey the accompaniment of ABO Blood Group System and Rh type with infection to hepatitis C virus in India. This was a retrospective study in patients during October 2019-March 2022 in India. The population of blood donors was tested for blood borne infections, including HCV. Logistic regression was used and collected data were analyzed using SPSS v.16. A total number of 901 people referred to the organization for donating blood during aforementioned years. Of these, 224 people had a history of hepatitis C disease, including 189 unmarried persons and the rest were married. 167 individuals were males and 57 individuals were females. People who had viral diseases were comprised of 76 persons with negative Rh and 148 positive persons with Rh. Future aims should include studies into blood groups and Rh types, according to the results of this study, in order to avoid the spread of blood-borne infections. Furthermore, further study is needed to establish the particular blood kinds that provide an elevated danger for classified donors.

Keywords

Hepatitis, HCV, HBsAg, Rh, ABO system, Blood group

INTRODUCTION

In the process of blood transfusion, blood-borne diseases such as HIV, HBV, and HCV may be transferred to individuals. Pathogens are unlikely to be transmitted in a single blood unit transfusion [1]. In recent years, there has been a lot of interest in

researching the probable link between blood types and blood-borne illnesses [2]. Blood groups may have a role in the development of disorders such as stomach cancer, stomach ulcers, coronary artery disease, erythroblastosis fetalis, endocrine malignancies, venous thromboembolism, and epithelial ovarian cancer [3]. Researchers have discovered a link between infectious illnesses in humans and the genes

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that secrete them, while other blood group antigens seem to be more impacted by basic factors such as blood group polymorphism [4]. In a research done in Thailand, it was shown that although the majority of persons with ABO blood groups were comparable to others in terms of primary dengue virus infection, those with A and B blood groups were more sensitive to grade 3 dengue hemorrhagic fever than those with grade 1 and 2 [5]. Another research conducted in Iran found that persons with the O blood type are 8.3 times more susceptible to Cholera than those with other blood groups of the same age, gender, and living environment. Furthermore, persons with Rhesus blood group types [Rh]- had a 3.2 times greater chance of contracting Cholera than people with Rh+ [6]. According to studies, the differences in frequency between people with blood group A and those with blood group B are due to random genetic variation, fundamental effects, and natural selection among various blood groups; additionally, the interaction between microorganisms and red blood cell membrane is likely due to antigenic similarity, adhesion through specific receptors, or antibody response regulation [7]. Surface antigens A, B, and AB on human red blood cells identify the kinds of blood groups. People with the O blood type have no antigen on the surface of their red blood cells. They do, however, carry antibodies to blood types A and B. Antibodies against the B antigen are found in persons with the A blood group, and vice versa, whereas those with the AB blood type have no antibodies against blood group antigens in their serum. These facts are crucial in defining the human body's inherent resistance to infectious disease pathogens that share the same surface antigens [8]. People with blood type AB are more susceptible to infectious pathogens containing antigens A, B, or both. This is due to the fact that persons with the AB blood group have no antibodies against the A and B antigens of blood types [9]. The goal of this study was to investigate the potential role of blood groups and Rh and infection to HBV and HCV infections among people, given the undeniable importance of this issue and the fact that no previous study has assessed the associations between people with A, B, O, and Rh blood groups and people with hepatitis C in this specific area of India.

MATERIALS AND METHODS

Place and duration

During the 30 months of survey from 2019 (October) to 2022 (March), a retrospective research was conducted

among patients in India (December). Furthermore, all ethical considerations for maintaining patient personal information were taken into account. The HCV survey predominantly includes the information taken either directly from the patients and/or the blood bank of the respective hospitals (AMRI Hospital, Bhubaneswar, Orissa and MCH Hospital, Karimnagar, Telangana) located in the Indian states of Orissa and Telangana (Ethical permission number: VIPS/EC/2021) (Figure 1).

Data collection and laboratory tests

All personal and demographic information of patients including age, sex, marital status, location, occupation, education level, and blood group and Rh blood donors have been documented by the Blood Transfusion Organization. All blood donors were tested for the presence of blood borne diseases HCV infections. HBsAg Enzygnostic 6-0 kit manufactured by Siemens, Hapanostika HCV Ultra kit manufactured by Beijing United Biomedicine Company, and Vironostika HIV Ag-Ab manufactured by Biomerieux Company was used for testing HBsAg, anti-HCV and HIV Ag-Ab, respectively. Initial tests were performed by ELISA method. In the cases with positive results HBSAg, RIBA, Western Blotting-P24 tests were applied for proving the results obtained for HBS Ag, HCV Ab, and HIV Ag-Ab respectively. The distribution of ABO and Rhesus blood group types was investigated in the aforementioned infected people with HCV.

Statistical Analysis

For statistical data analysis, the SPSS programme version 16 was used. For summarizing data, descriptive statistics were utilized, and logistic regression was performed to analyze the influence of factors on the kind of viral infection. The significance threshold was also set at 0.05.

RESULTS

A total number of 901 people referred to the organization for donating blood during aforementioned years. Of these, 224 people had a history of hepatitis C disease, including 189 unmarried persons and the rest were married. 167 individuals were males and 57 individuals were females. People who had viral diseases were comprised of 76 persons with negative Rh and 148 positive persons with Rh. The seroprevalence rate of diseases investigated in the present study based on the blood group and Rh factor of people are indicated in Table 1. B+, O+, and

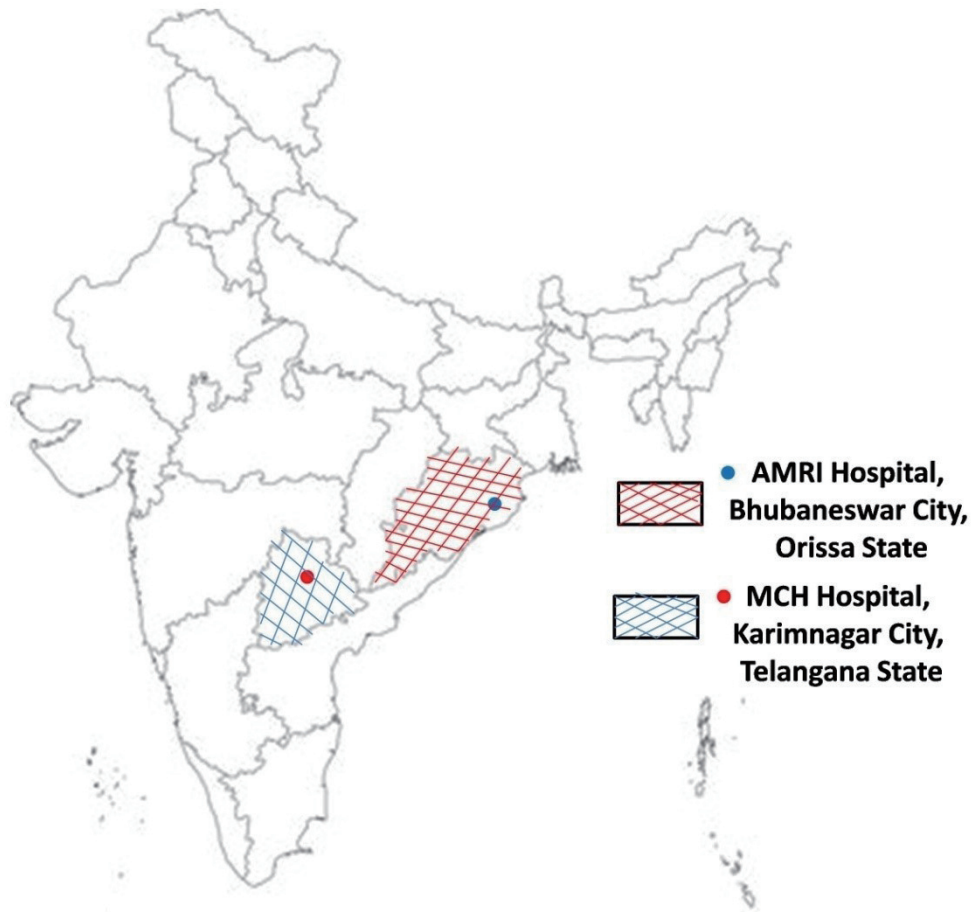


Figure 1. Area covered and main center for data collection.

Table 1. The distribution of healthy and infected people among various blood groups.

Blood Group	HCV	%	Patients	Donors
A+	22	10.42	57	211
A-	1	1.47	7	68
B+	9	9.78	53	92
B-	8	14.28	13	56
AB+	4	5.00	12	80
AB-	6	8.45	10	71
O+	21	7.52	67	279
O-	1	2.27	5	44
Total	72	7.99	224	901

A+ were the most widespread blood groups among the people with positive HCV. Moreover, AB- was the least prevalent blood group among people with positive HCV. However, by comparing the percentages of various blood groups, it can be seen that the positive HCV had a high prevalence among people belonging to

the B+, O+, B-, and AB-. Furthermore, A- and O- blood group had the lowest incidences. Figure 2 describes the distribution of HCV patients.

Table 2 shows the assessment of risk ratio for people with various blood group and Rh that are infected with viral infections. Based on the analyzed

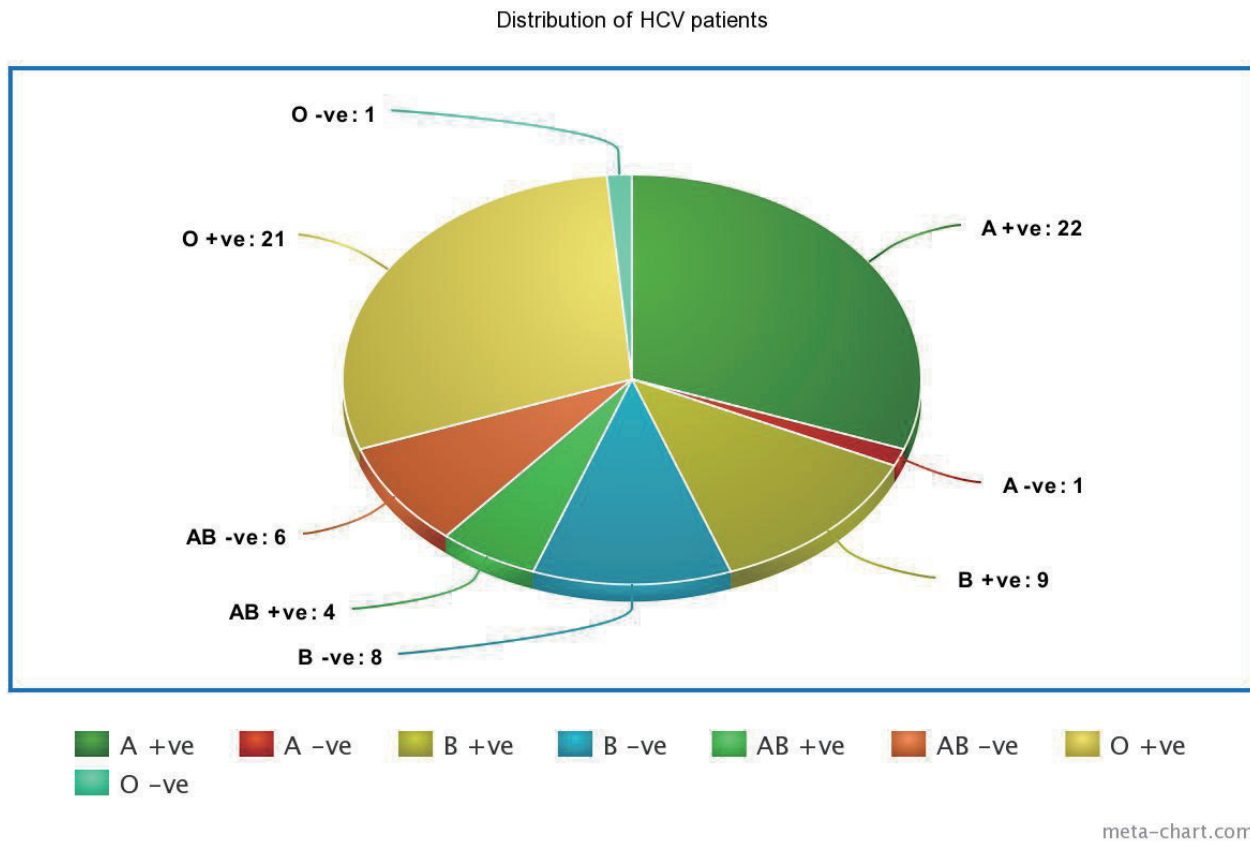


Figure 2. Distribution of HCV patients.

Table 2. Association of blood groups and Rh type among donors infected by viral disease.

Dependent Variables	Independent Variables	P-value	Odds ratio	95% confidence interval	
HCV	Rh	0.19	1.08	0.26	1.09
	Group	0.33	0.94	0.39	1.87

data which are shown in this table, there was no significant association between blood groups and hepatitis C [p-value>0.05]. However, a significant association was found between Rh type and affliction to disease [p-value] so that people with negative Rh have upto50%less chance than others to have hepatitis C.

DISCUSSION

Several researches have sought to explain the link between ABO blood types and infection transmission. People with the O blood type and a positive Rh are more susceptible to blood-borne diseases, according to research. The data showed the effects of blood group types on hepatitis C were minimal to address this

problem. Furthermore, persons who tested positive for Rh were 4.3 times more likely to be infected with hepatitis C. This contradicts the findings of the aforementioned study, which found that negative Rh had the greatest rate of anti-HCV. Our findings might indicate that those with negative and positive Rh have a higher risk of HCV infection than others, although this cannot be linked to a particular blood type. To get a better understanding of this trait, larger-scale experiments are necessary [10].

These findings are somewhat consistent with those reported in another research conducted in Babol, Iran. They discovered no significant relationship between chronic hepatitis B and its treatment and ABO blood groups in that research, but they did identify a strong link between Rh type and chronic hepatitis B, with 97.9% of chronic carriers having positive Rh. Although

there was no significant link between becoming infected and blood group types in the current investigation, People with the O+, A+, and B+ blood types, on the other hand, had a greater prevalence of HCV and HBV than others [11].

Furthermore, it was found no significant link between positive HBsAg status and blood group types in another investigation. In line with the previously published results, an Iraqi investigation found that HBsAg and HCVAb were more common in persons with the O+ and rare in those with the AB blood group. Furthermore, those with hepatitis infection had a higher rate of positive Rh factor than those who did not [12].

Furthermore, it was found that those with the O+ and positive Rh blood types had the greatest rates of hepatitis [13].

Another research in Nepal revealed no significant link between HBV and blood types, however persons with the positive O+ had a greater risk of developing these illnesses [14].

There was no consistent link discovered between the data and our findings. They demonstrated that blood types other than O+ are a hereditary risk factor for liver fibrosis progression. This might be owing to an increased risk of venous thrombosis in HCV-infected individuals [15].

According to a Chinese research, persons with the AB and B blood types were more likely to be infected with the hepatitis B virus than those with other blood groups [16].

However, a research done in Iran found that persons with the B+ had a larger proportion of CD4+ T-lymphocytes than those with other blood groups. As a consequence, it may be assumed that persons with the B blood type have a reduced risk of viral and infectious illness [17].

CONCLUSION

In conclusion, various researches studying the relationship between blood types and the risk of infectious illnesses have shown a convoluted relationship in this area. It's tough to draw definite conclusions based on the many reported outcomes in this field. As a result, the true relationship between blood type and infectious illnesses is still up for discussion. Other relevant elements, such as national and ethnic disparities, are thought to play a role in this complex relationship. Furthermore, further study is clearly required to have a deeper grasp of the issue. Future aims should include studies into blood groups

and Rh types, according to the results of this study, in order to avoid the spread of blood-borne infections. Furthermore, further study is needed to establish the particular blood kinds that provide an elevated danger for classified donors.

Conflict of interest

There are no conflicting interests, as the authors have stated.

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