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Research Article

STUDY TO DETERMINE THE HEPATITIS B AND C VIRAL INFECTIONS AMONG BLOOD DONORS

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Background: The hepatitis B virus and the hepatitis C virus are a major public health problem worldwide, affecting billions of people. There is no information available on this in the investigated area.

Aims: The aim of the study was to assess HBV and HCV seroprevalence among blood donors.

Place and Duration: In the Hematology and Medicine Unit-II of Services Hospital Lahore for one-year duration from May 2019 to May 2020.

Method: A cross-sectional study of blood donors was conducted. Five milliliters of blood samples were taken and subjected to ELISA tests to detect hepatitis B surface antigen and hepatitis C antibody. Chi-square tests and Fisher tests were used for analytical evaluation.

Results: Of the 2,384 blood donors tested, 108 (4.5%) were seropositive for at least one of the two markers of hepatitis, five of which were co-infected. The prevalence of HBs Ag and anti-HVC was 4.11% and 0.63%, respectively. High HBV seropositivity (8.3%) was found in > 45 years, and the positive HBV result was significantly higher among men (4.4%) than women (1.45%) ($P = 0.04$). The incidence of HCV was significantly higher at > 45 years of age (2.5%, $p = 0.01$).

Conclusion: The prevalence of HBV and HCV was high, and diseases continued to be a serious health problem for older people in the study area, warning of public health intervention as soon as possible.

Keywords: Pakistan, Hepatitis B virus, Hepatitis C virus, Seroprevalence, Blood donors.

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INTRODUCTION:

Hepatitis B virus (HBV) and hepatitis C virus (HCV) are the leading causes of serious liver diseases such as hepatocellular carcinoma (HCC) and life-threatening liver diseases. Worldwide, there are approximately 360 million chronic HBV infections and 5.7 million HBV-related cases [1-2]. Cirrhosis, liver failure, and hepatocellular carcinoma develop in 15-40% of people with chronic hepatitis B infection.² About 3% of the world population have been infected with HCV, with a higher incidence ranging from 4% to 6% in parts of Africa. Over 80% persists as chronic HCV infection [3-4]. In Pakistan, the report indicated that the prevalence of anti-HCV antibodies among patients with chronic hepatitis, cirrhosis and HCC was 21%, 36% and 46%, respectively [5-6]. In addition, approximately 50% of healthy subjects had at least one HBV marker between the ages of 20-24 years. Blood transfusion, vertical transmission during pregnancy, and sexual or hospital exposure are risk factors for HCV and HBV infection and remain a significant risk for HIV-infections [7-8]. Although the risk of blood transfusion-borne infections is now lower than ever, the supply of safe blood products is still at risk of being infected with many human pathogens.⁷ Hepatitis B and HCV are a major concern of blood-borne infections due to their prolonged viral load and carrier status.⁸ Hepatitis B is highly contagious and is relatively easily transmitted from one infected person to another via blood transfusion, and in the tropics there is a relatively higher prevalence of HBV.^{9,10} An accurate estimate of the prevalence of these viruses in a given population is very important for monitored a safe blood supply and effective planning of preventive strategies [9-10]. In Pakistan, especially in the study area, there is no information available on this topic. Therefore, the aim of the study was to evaluate the seroprevalence of HBV and HCV infections among blood donors.

METHODS:

This study was held in the Hematology and Medicine Unit-II of Services Hospital Lahore for one-year duration from May 2019 to May 2020. The study was verified and approved by the Institutional Audit Committee. Written informed consent was obtained from each potential blood donor recruited for the study. The individual records were coded and available only to the research team. The collected

data from the study was analyzed anonymously. Individuals who were confirmed to be seropositive for one or both HBV and HCV infections were assessed and treated according to the current standard. People who meet the blood donation screening criteria: age 18 to 65, body weight over 50 kg, normal body temperature, hemoglobin level, blood pressure and no symptoms of acute infection, no history of infectious and chronic diseases, blood donation. Blood donors who did not meet the blood donation criteria set out in the inclusion criteria were excluded from the study. Therefore, all study participants recruited for this study had no history of a known or noticeable risk factor. Data collection and processing: Data from each study subject was collected with written informed consent. Structured questionnaire interviews with the study participants were used to collect the necessary sociodemographic information on blood donors, gender, age and place of residence, type of donor, profession and marital status. Approximately 5 ml of blood samples were collected from each blood donor from a collection bag using a sterile stopper tube. The blood was centrifuged and the plasma separated and stored at -20 ° C until tested. The samples were brought to room temperature prior to testing. All blood samples have been tested for hepatitis B surface antigen (HBsAg) and anti-HCV antibodies based on established screening procedures as recommended by the manufacturer. Each plasma sample was tested for HBsAg and anti-HCV antibodies using enzyme immunosorbent assay (ELISA) kits. Internal quality controls were performed for each test.

The data was manually cleared, categorized, coded and entered and analyzed using SPSS version 20. Descriptive analysis was used to determine the demographic and seroprevalence characteristics of HBV and HCV. Differences in the proportions of risk factors associated with HBV seroprevalence and HCV seroprevalence were investigated by chi-square and Fisher's exact tests. Significance levels were chosen at the level of 0.05 in a two-tailed test.

RESULTS:

The seroprevalence rate of HBV infection was 4.11%, with 95 (4.4%) of 2,177 men and three (1.45%) of 207 women having HBV infection. The overall HCV prevalence rate in the study was 0.63% and they were all male.

Table1: Sociodemographic characteristics of blood donors recruited at Bahir Dar

Variable		Frequency	(%)
Gender	Male	2177	91.3
	Female	207	8.7
Age in years	18-25	1233	51.7
	26-35	758	31.8
	36-45	272	11.4
	>45	121	5
Residence	Urban	1632	68.4
	Rural	752	31.6
Type of blood donor	Volunteer	3	0.1
	Commercial	1356	56.9
	Relative of recipient	1025	43
Occupation	Daily laborer	1356	56.9
	Farmer	739	31
	Student	132	5.5
	Employed	78	3.2
	Merchant	18	0.7
	House wife	61	2.5
Marital status	Single	1514	63.5
	Married	870	36.5

The highest HBV seroprevalence was observed in blood donors over 45 years of age (8.3%), and then in 36–45 years 14 (5.9%).

Table.2: Serological test result blood donors

Variables	Status	Number (%)
HBsAg	Positive	98 (4.11)
	Negative	2286(95.9)
Anti –HCV antibody	Positive	15(0.63)
	Negative	2369(99.4)
Co-infected	Positive	5(4.6)
Total	Positive	108(4.5)
	Negative	2276(95.5)

Similarly, high HCV 3 seroprevalence (2.5%) was observed in the age groups over 45 years. Among city-based blood donors, HBV and HCV seroprevalence was 68 (4.1%) and 10 (0.6%) respectively. Of 1,356 commercial blood donors, 62 (4.6%) for HBV and 10 (0.7%) for HCV were seropositive (Table 3). The difference in HBV 95 seroprevalence rate (4.4%) in males versus 3 (1.4%) in females was statistically significant ($\chi^2 = 4.074$, $p = 0.04$). However, no statistically significant

relationship between HCV seroprevalence and gender was found ($p = 0.63$). The highest HCV seroprevalence was observed in blood donors over 45 years of age (2.5%), and then at the age of 18–25 (0.8%). The difference in HCV seroprevalence between the different age groups was statistically significant ($\chi^2 = 10.57$, $P = 0.01$). However, age distribution and HBV seroprevalence were not significantly related ($\chi^2 = 7.3$, $p = 0.06$). Nevertheless, the differences in the HBV

seroprevalence rate among the donor occupations were not statistically significant ($\chi^2 = 2.67$, $P = 0.75$). Moreover, no significant relationship was found between the place of residence, types of blood donors, occupations, and marital status, and HBV and HCV seroprevalence.

DISCUSSION:

In this study, 4.11% and 0.63% of subjects were positive for HBsAg and HCV, respectively. Higher (6%) HBV seropositivity was previously reported in Pakistan. This means that there has been a significant change in HBV seroprevalence in the area over the last decade. When comparing the results of the current study with those obtained from similar study participants from other countries, comparable prevalence of HBV was reported, eg in Kosovo (4.2%)¹² and Egypt (4.3%) [11]. The incidence of HBsAg in this study was lower than in Nigeria ((14.3%), but nevertheless higher than the seroprevalence rate reported in India (2.2%), Turkey (1.38% and 1.8%), Libya (1.28%) and Iran (1.07%). Socio-cultural differences could be a possible factor behind these differences. Regarding HCV infection, the overall prevalence of HCV antibodies was 0.63% in this study, which was significantly lower compared to reports from Tunisia (1.4%), Egypt (2.7%) and Senegal (0.8%). The seroprevalence of anti-HCV antibodies was comparable with the results reported among blood donors from Libya (0.69%) and India (0.7%), but this result was higher compared to the results obtained in Kosovo (0.3%)¹² and Turkey (0.35%)¹⁶ In this study, despite the large number of donors tested (207 subjects), none of them were positive for HCV antibodies¹². A low incidence (five cases out of 2,384 blood donors tested) was found, indicating that HBV donors positive in this study are not at high risk of HCV infection. The pattern of hepatitis co-infection was higher among blood donors over 45 years of age compared to other age categories. Demographic analysis of 98 blood donors who were seropositive for HBV infection showed that it was significantly higher in men (4.4%) compared to women (1.45%) ($p = 0.04$). A recent study in Pakistan found a statistically significant difference in HBsAg seroprevalence between male and female donors (2.5% in men and 0.8% in women)¹³⁻¹⁴. Similarly, in the general population from Pakistan, the prevalence of HBsAg in men (8.6%) was significantly higher than in women (4.6%). We found an increasing incidence of HBsAg and anti-HCV antibodies with the age of blood donors, which was similar to the results of the hepatitis B antibody study, from a study that was reported in Vietnam, this may be due to an increase in age risk of HBV exposure and HCV

increases in parallel. Therefore, this finding may suggest that HBV and HCV infections may increase gender susceptibility due to differences in gender risk behavior as well as aging over time. Other important findings we saw were the high prevalence of HBsAg (4.6%) and HCV (0.74%) antibodies among commercial blood donors and HBsAg (4.6%) in daily laborers compared to other blood donors. The prevalence of HBsAg and HCV among commercial blood donors in this study is comparable to that of previous studies in Pakistan²⁴, but lower than the result from Nigeria where the prevalence of HBV was 11%. In the present study, only three volunteers (0.1%) donated blood during the study period¹⁵. This means that the community lacks knowledge or awareness about donating blood.

CONCLUSIONS:

HBV and HCV seroprevalence was significantly high among the blood donors in our study, and male blood donors are more affected than women. In addition, HBV and HCV seroprevalence was higher in elderly and commercial blood donors. Due to the high percentage of blood donors who are HBsAg and HCV positive, careful selection of blood donors should be considered. Promoting and creating public awareness of voluntary blood donation should be considered, rather than the use of commercial blood donors, therefore prevention of health care risks and health education among the population should be considered as the main interventions that can help reduce the spread of this blood-borne transmitted infections.

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