

Seropositivity to viral hepatitis in blood donors in north Darfur state-Sudan

Abstract

Objective: The aim of this research is to investigate the sero-prevalence of hepatitis B (HBV) and hepatitis C (HCV) infection among apparently healthy volunteer blood donors, as well as the relationship between serological evidence of viral hepatitis and age and demographic characteristics.

Methods: A retrospective study of sequential blood donation findings from January to December 2017 was performed in North Darfur, Western Sudan. The descriptive quantities were calculated using Chi-square test.

Results: A total of 4527 respondents showed an interest in donating blood. All of them were between the ages of 17 and 49 years. A total of 247 (5.5%) and 19 (0.4%) donors tested positive for HBV and HCV, respectively, while 4280 (94.5%) and 4508 (99.6%) donors tested negative for HBV and HCV, respectively. On both HBV and HCV, there was a strong association between serological evidence of viral hepatitis and age ($P=0.000$). In comparison to the other age categories, the prevalence of HBV and HCV was higher in age group (35-39) and (40 or more) years, (76/247) 30.8 % and (171/247) 69.2 % for HBV and (7/19) 36.8% and (12/19) 62.2 % for HCV.

Conclusions: Blood donors in North Darfur have been shown to have a high prevalence of HBV infection and a low frequency of HCV. There was a statistically significant relationship between viral hepatitis and age, but a negative statistically significant relationship between occupancy and age.

Keywords: HBV, HCV, north Darfur, Sudan

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Mohammed Ahmed Ibrahim Ahmed,¹
Nassreldeen Khalid Abdelrahman,² Nahla
Ahmed Mohammed Abdelrahman,³ Marawa
Ahmed Mohammed Abdelrahman⁴

¹Department of Microbiology, Nile Valley University, Sudan

²Department of Hematology, University of Al Fashir,

³Department of Biochemistry, Nile Valley University Atbara, Sudan

⁴Department of Dermatology, Ministry of Health, Sudan

Correspondence: Mohammed Ahmed Ibrahim Ahmed, Assistant professor of Microbiology, Nile Valley University, Faculty of Medicine, Atbara, Sudan, Tel +24901 22570655, Email mohammedabukleewa@gmail.com

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Abbreviations: HCV, hepatitis C; HBV, hepatitis B; TTIs, transfusion transmissible infections; WHO, world health organization; ACBB, Al-Fashir central blood; VNRBD, voluntary non-remunerated blood donation volunteers

Introduction

HBV is one of the world's most prevalent infectious diseases, infecting two billion people worldwide, with an estimated 400million chronically infected cases. HCV infection is another widespread chronic blood-borne infection, with an estimated 3.9million people infected and a high incidence of liver cirrhosis formation.¹

Donating blood is a life-saving procedure that saves millions of lives per year all around the world. Blood transfusions, on the other hand, are linked to a variety of risks that may have harmful consequences. It has the ability to cause acute or delayed symptoms, as well as the potential to spread infection. In a yearly basis, nearly 81million units of blood are donated around the world.²

Blood transfusion is not a real replacement, but it is a medical intervention. However, rather than saving lives, a contaminated blood transfusion can spread infectious diseases and be catastrophic.³ Documents on the prevalence of transfusion transmissible infections (TTIs) in blood and plasma donors, as well as Human Immunodeficiency Virus HIV, HBV, HCV, and syphilis antibodies, can be used to determine the presence of infections in the blood donation community and, as a result, the effectiveness of donated blood. It also provides insight into the epidemiology of these diseases in the general population. Another major source of risk is transfusion-related diseases.⁴

The three types of TTIs are bacterial, viral, and parasitic infections. The most prevalent form of transfusion infection is viruses. HIV, HBV, and HCV have all been linked to post-transfusion infections in some circumstances.⁵ The prevalence of HBV infection ranges a lot from country to country. The World Health Organization (WHO) divides HBV prevalence into three categories: high endemicity (>8%), medium endemicity (2-7%), and low endemicity (less than 2%).⁶ Globally, the HBV infects about 350million individuals, while the HCV infects about 125million, making viral HBV and HCV infection among the world's most severe infectious diseases. As a result, these diseases are prime targets for public health initiatives aimed at preventing, diagnosing, and treating them as early as possible.

The advent of (TTIs) has ushered in a modern era in blood transfusion therapy around the world, based on two top priorities: protection and the health of human life. Blood preservation is also a major concern in transfusion medicine.⁷ Estimating the prevalence of TTIs, as well as HBV, HCV, HIV, and syphilis antibodies or antigens, in blood donors would highlight the problem of undiagnosed diseases in even the healthiest individuals, as well as include data that can be used to develop approaches to improve blood supply management. It moreover provides us an approximate estimation of the extent of these sexually transmitted diseases.^{8,9}

Materials and methods

Study Design: A retrospective comparative study of blood donation data reports from 2017 was carried out. The logbook recorded the donors' medical and socio-demographic backgrounds, including age, gender, region/zone of residence, method of donation, and frequency of blood donation.

Study area

The information was taken from the logbook of the Al-Fashir Central Blood Bank (ACBB). ACBB is the only facility in Al-Fashir City (the capital of North Darfur State) that delivers TTI-tested blood and blood products to the city's ten hospitals. A number of parts make up the center. It has a reception area, a donation clinic, laboratory sections (TTI, Immunohematology), a collection area, and Component Preparation Sections. The facility's donors are mostly families and colleagues, including a few Voluntary Non-Remunerated Blood Donation volunteers (VNRBD). The TTI section's HIV, HBV, HCV, and Syphilis tests were all carried out in full accordance with current national research protocols and guidelines.

Study population

According to Sudan's national blood transfusion procedure, 4527 individuals were chosen as blood donors based on a pre-determined requirement that included age (17-49 years), weight (>50kg), and medical background.

Study variable

The HBV and HCV test results were the dependent variables in this report, while residence and age were the independent variables.

Screening methods

Following the manufacturer's guidelines, serum from both blood donation units was tested for the presence of HBV and HCV antibodies using a viral hepatitis antibodies rapid examination cassette (fortress diagnostics/UK). Kits for Enzyme-Linked Immunosorbent Assay Test (fortress diagnostics/UK) were used to confirm the findings of the viral hepatitis antibodies rapid test.

Ethical approval

The Al-Fashir University Research Ethical Committee board and the Sudan Ministry of Health Research Ethical Committee also gave their approval. However, due to the scope of the study (retrospective records analysis), no respondents participated at any stage, and no informed consent was secured.

Data analysis

The Statistical Package for Social Sciences software (SPSS Inc., Chicago, IL, USA) version 20 was used for data entry and interpretation of the patients' demographic characteristics; The HBV and HCV test results, as well as demographic data, were evaluated using simple descriptive statistics. The Chi-square test was used to compare the percentage of each pair of variables. It was decided to use a statistically significant p-value of less than 0.05.

Results

A total of 4527 male blood donors from various El-Fashir neighborhoods were documented in the research. Participants varied in age from 17 to 49 years old (mean 29.2 years). The prevalence of HBV and HCV was reported to be 5.5 % (247/4527) and 0.4 % (19/4527) respectively (Table 1). The results showed a statistically important association between HBV, HCV and age ($P=0.000$) for both, the proportion of positive serological evidence of HBV and HCV in individuals aged (35-39) and (40 or more) years (76/247) 30.8 %, and (171/247) 69.2 % for HBV and (35-39) and (40 or >) years (7/19) 36.8 %, and (12/19) 62.2 % for HCV (Table 2). The association between HBV and HCV serological indication and residence was negligible ($P=0.318$) for HBV and ($P=0.982$) for HCV (Table 3).

Table 1 Distribution of study group according to sero-prevalence of HBV and HCV

Variable	Lab Result	Frequency	Percent %
HBV	Positive	247	5.5
	Negative	4280	94.5
HCV	Positive	19	0.4
	Negative	4508	99.6
Total	-	4527	100.0

Table 2 Distribution of sero-prevalence of HBV and HCV among study age group

Age Group (years)	HBV group			HCV group		
	Positive	Negative	Total	Positive	Negative	Total
<=25	0	1379	1379	0	1379	1379
25-29	0	1157	1157	0	1157	1157
30-34	0	875	875	0	875	875
35-39	76	541	617	7	610	617
>=40	171	328	499	12	487	499
Total	247	4280	4527	19	4508	4527
p- value	< 0.0001			< 0.0001		

Table 3 Distribution of sero-prevalence of HBV and HCV among study residence group

Residence group	HBV group			HCV group		
	positive	negative	Total	positive	negative	Total
El- Fashir	203	3583	3786	15	3771	3786
Camps	11	260	271	3	268	271
Algararif	0	2	2	0	2	2
Dar Alslam	6	32	38	0	38	38
Alkoma	4	43	47	0	47	47
Almalha	2	24	26	0	26	26
Altwasha	0	1	1	0	1	1
Kabkabia	2	53	55	0	55	55
Khartoum	1	7	8	0	8	8
Madany	0	3	3	0	3	3
Nyala	0	22	22	0	22	22
Malit	3	64	67	0	67	67
Serife	2	25	27	0	27	27
Umkadada	4	27	31	0	31	31
Kalamendo	1	30	31	0	31	31
Kutoum	6	64	70	1	69	70
Tawila	2	40	42	0	42	42
Total	247	4280	4527	19	4508	4527
p- value	0.318			0.982		

Discussion

HBV prevalence was 5.5 percent, which was lower than the study stated by Abou, AA et al.¹⁰ According to a study implemented in Nyala, South Darfur, 6.25 % of blood donors positively identified for HBV and 65% for HCV which was greater than our finding. Our report may reflect the prevalence rate of HBV and HCV in reality more than Abou, AA et al. 2009 because of larger sample size involved in our study when compared with Nyala report.

Also our study differs than other document presented by Abdel Salam et al¹¹ in study carried out in Elobeid, North Kordofan State-western Sudan; was stated that (9.3%) for HBV and (3.5%) for HCV, this discrepancy attributed to smaller study samples documented by other studies. This distinction may be regarded with caution because our research was done in a region with a lack of health education about prevention measures of sexually transmitted diseases, while the comparable areas used effective preventive methods.

The age of the blood donors ranged from 17- 49years with a mean of 29.2years, this finding was similar that of Abdel Salam et al¹¹ and other study conducted in Nigeria by Olokoba et al. 2008. They documented that more than half of blood donors with positive HBV and HCV antigens are belonging to age group 28-37years. Their finding were disagree with our study which reported that the age categories (35-39) and (40 or more) involve high occurrence rate of HBV and HCV. This variation in sero-prevalence of HBV and HCV among different societies in Sudan may refer to the diversity in the number of screened blood donated units.

The current study found an insignificant statistical association

between HBV, HCV and residence by ($P = 0.318$) and ($P = 0.982$) respectively. This result opposed to another research cited by (Mohammed Y& Bekele A¹³⁻¹⁵ who was reported the correlation of HBV and HCV sero-prevalence and a lack of health education in rural residence, and how our study areas share the same situation in terms of health infrastructures and facilities.

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Conflicts of interest

There are no conflicts of interest in this report, according to the authors.

Authors' Contributions

The authors shared joint responsibility for the study's design and manuscript preparation. All authors approved the final edition of the manuscript.

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