

Epidemiology of Hepatitis C Virus in the private blood banking sector in Osogbo, Southwest Nigeria

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ABSTRACT

Background: Hepatitis C Virus (HCV) is an agent of Transfusion Transmissible Infection (TTI) which serves as a threat to blood safety and sufficiency of blood and blood products supply.

Objectives: This study aimed at determining the distribution patterns of HCV among potential blood donors in a private Blood Bank in Osogbo, Nigeria.

Materials and Methods: Over a period of 6 months, 290 consenting prospective blood donors were recruited for this study by convenient sampling technique. Pre-test counseling was done, before blood specimen collection and laboratory serological analysis was carried out, using third generation Enzyme Immunoassay Technique.

Results: The mean age of the respondents was 35.99 ± 10.94 years. A total of 6 participants (2.07%) tested positive for anti-HCV. In this study, HCV prevalence has no association with age and blood type, but it does with the donor type, where the prevalence is higher among commercial blood donors.

Conclusion: The rates were lower than the previous studies in Nigeria perhaps this is due to the positive effect of public awareness on transfusion transmissible infections and the fact that majority of the donors were regular donors. Blood transfusion services should be further strengthened by establishment of blood transfusion committees at State level, to regulate and monitor the practice, especially in the private sector, with a view to ensure that stringent criteria are adhered to in blood donors' selection.

Keywords: Blood Safety, Hepatitis C Virus, Serology and Private sector.

Blood transfusion is an essential part of patients' care. Transfusion of blood components plays a fundamental role in the management of various pathologies and is sometimes a life-saving treatment.

Blood is a limited resource whose financial worth is unquantifiable. Albeit, sale of blood and other body tissues is prohibited by ethics¹, recompense and transaction in blood transfusion services cannot be totally avoided^{2, 3}. Over the last 20 years, there has been a progressive increase in demands for blood products, mainly as a result of the advances in oncohaematological therapies and the increase in major surgery⁴. Thus, this translates into increased risk proportional to increase in volume of transfusion practices⁵. Transfusion-transmissible infections (TTIs) are infections transmissible from person-to-person through administration of blood or blood products⁶. Known agents of some TTIs include: Hepatitis A virus (HAV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Hepatitis D virus (HDV), hepatitis G virus (HGV), Human Immunodeficiency Virus (HIV), *Treponemapallidum*, *Plasmodium*

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species and Human T-lymphotropic Viruses-1 and II (HTLV-1 and II)^{7,8}.

Available data indicate that approximately 3% of the world's population is infected with HCV⁹.

In Nigeria, Egah *et al.*¹⁰ reported 6% prevalence among the 200 blood donors studied in Jos. This is also similar to the 5.8% prevalence reported among blood donors from southern Nigeria¹¹. The prevalence rates found by these authors are however higher than the 2.8% found among blood donors in Ghana¹² and the 2.9% found among blood donors in Port Harcourt¹³; but lower than the 12.3% prevalence reported among Nigerian blood donors in Benin city¹⁴ and the 15.8% recorded among Egyptian blood donors¹⁵.

In developing nations, blood safety continues to be a major dilemma due to high prevalence of infectious agents among blood donors compounded with the problem of limited resources that preclude the use of sophisticated, sensitive and specific technologies for screening blood and blood products. The economic costs of a failure to control transmission of infections includes increased requirements for medical care, higher levels of dependency and the loss of productive labour force which places heavy burdens on already overstretched health and social services and on the national economy¹⁶. The literature revealed that the prevalence of HCV among blood donors varies from one population to another and constitute a major source of concern in blood safety globally but particularly in developing countries, including Nigeria¹⁵. Private blood banks constitute about 50% of blood transfusion sources in Osun State and the only source to access this component of healthcare during industrial strike periods of government employees-situation that is now common in Nigeria¹⁷.

This study aimed at determining the distribution pattern of Hepatitis C Virus (HCV) infection among prospective blood donors in a private diagnostic center in Osogbo, the capital city of the State of Osun. The objectives, therefore, included: to determine the prevalence of anti-HCV among blood donors in the private sector of blood

transfusion service of Osogbo, Nigeria and provide relevant information to authorities that can assist in assessing the need for local legislations by states' houses of assembly and policies on safe blood transfusion. Outcome of this work will be useful as a source of reference and knowledge to readers while also serving as a gate opener for further researches.

MATERIALS AND METHODS:

Study setting:

This study was carried out in Group Diagnostica Laboratory- a major private medical laboratory in Osogbo, the capital city of Osun State; in the southwest geopolitical zones of Nigeria. The laboratory operates a Blood Bank where blood donation exercises and blood units and products storage are being rendered as services.

Study subjects:

A total of two hundred and ninety (290) prospective apparently healthy blood donors who presented themselves for pre-donation screening exercise at Group Diagnostica, Osogbo between April and September, 2013 were recruited for this study. All the blood donors were offered pre-test and post-test counseling. The participants ages were between 18 and 65 years, with a body weight of 50kg and above for male and 45kg and above for female. The 3 predominant types of donors being customarily accepted for donation in Nigerian communities were included as they approach the laboratory, sequentially. These include: voluntary donors, relative donors and paid donors.

Care was taken to ensure that no donor is used more than once and those who have history of recent ill health, received blood transfusion or who had donated blood within the last 3 months prior to this study were excluded. Individuals with packed cell volume (PCV) values less than 35% and 32% for male and female respectively, history of jaundice, sickle cell disease, hypertension and history of current fever were also excluded.

Procedure:

Five milliliters (5ml) of venous blood were collected from each subject by venepuncture into vacuum EDTA tube. The specimens were

centrifuged at 1200 revolution per minute (rpm) for 5 minutes to harvest plasma into a microtube for the anti-HCV (IgG) testing with third generation Enzyme Immuno-Assay (EIA) method. Donor's plasma was added to the microwell together with a second antibody conjugated with the enzyme horseradish peroxidase (the HRP-Conjugate) and directed against different epitopes of HCV. During incubation, the specific immunocomplex formed in case of presence of anti-HCV in the sample, was captured on the solid phase which generates an optical signal that is proportional to the amount of anti-HCV antibodies present in the sample. The commercially prepared positive and negative controls were treated alongside the specimens. A cut-off value was determined and results were interpreted as positive and negative according to manufacturer's instructions¹⁸.

Statistical analysis:

The data generated were coded, entered, validated and analyzed using Statistical Package for Social Science (SPSS) version 17.0. The seroprevalence of HCV were expressed for the entire study group and comparison of means and variances were done by age, sex, blood group, blood donor type using t- test and levene's test respectively. Values below 0.05 were considered significant. The prevalence was also illustrated in pie charts.

RESULTS:

A total of two hundred and ninety (290) apparently healthy prospective blood donors aged between 18 and 65 years (Mean±SD, 35.99±10.94 years) who presented themselves for blood donation at Group Diagnostica, Osogbo were studied. Of the 290 blood donors, 283 (97.6%) were males. Also, 185 (63.8%) of the participants belong to the most active age group of 28-47. Of the 290 asymptomatic subjects, 217(74.8%) belong to O Rh D positive blood types, while there is neither AB Rh D positive nor B Rh D negative individuals included. Majority (91.7%) of the participants was paid donors while relative and voluntary donors constituted 7.2% and 1%, respectively. Six

(6) of the prospective blood donors representing 2.07% had serological evidence of infection with HCV. When subjected to statistical analysis using SPSS version 17, the Levene's test for equality of variance and t test for equality of means reveal no significant differences on prevalence on account of age (P=0.440) and blood group (P=0.755). However the donor's type shows significant difference (P=0.0000) with commercial donors being most vulnerable. Socio-demographical characteristics of the study group are shown in Table (1). Figure (1) shows the prevalence of anti-HCV among the subjects.

Table (1): Social-demographic data of studied participants

Characteristics	Frequency	%
Age (Year)		
18-27	61	21.0
28-37	119	41.0
38-47	66	22.8
48-57	29	10.0
58-67	15	5.2
Gender		
Male	283	97.6
Female	7	2.4
Type of donor		
Paid	266	91.7
Relative	21	7.2
Voluntary	3	1.0
Blood Group		
O Positive	217	74.8
O Negative	16	5.5
A Positive	30	10.3
B Positive	23	7.9
A Negative	2	0.7
AB Negative	2	0.7

DISCUSSION:

Hepatitis C Virus has emerged as the commonest cause of post-transfusion hepatitis. With no vaccine on site and low success rate of therapy, HCV has remained a major source of concern in Blood Safety globally. The male: female ratio of donors in this study was found to be 40.43:1. There was

a preponderance of male donors. This is probably due to an apathy associated with female donors as a result of physiological conditions like pregnancy, menstruation and lactation which make them unsuitable to donate blood during these periods.

This study shows prevalence of HCV to be 2.07% in the cosmopolitan city of Osogbo. This finding partly agree with 1.8% reported in Kaduna¹⁹ but is lower than 5.8% and 6% reported in southern Nigeria and Osogbo, respectively^{20, 21}. It is also somewhat lower than the 2.8% found among blood donors in Ghana¹² and the 2.9% found among blood donors in Port Harcourt¹³. The seroprevalence rate found in this study is however higher than values ranging between 0 and 1.4% reported from USA and Europe²¹⁻²³.

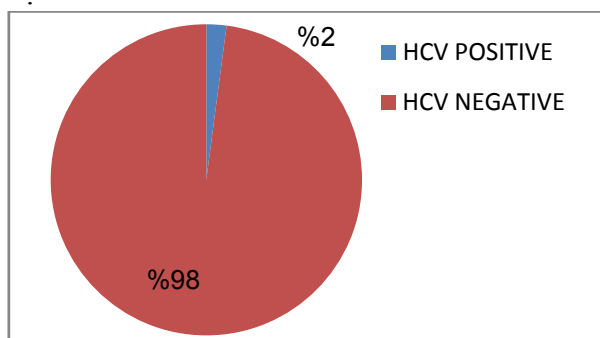


Figure (1): Prevalence of anti-HCV among the studied donors.

The differences in prevalence rates of anti-HCV between developed countries where rates are low and developing countries where prevalence rates are higher may be explained by certain factors. These include socio-cultural practices involving the use of instruments contaminated by blood and body fluids for procedures such as scarification, tattooing, circumcision which are common practices in many developing countries.

The finding of a high prevalence of anti-HCV antibodies among apparently healthy blood donors in Osogbo further confirms the presence of hepatitis C infection in Nigeria and brings to the fore the necessity of adopting measures that will ensure safe blood transfusion.

Majority of donors tested in this study were commercial remunerated donors. The number of voluntarily donated blood had continued to

fall over the years in Nigeria due to logistics or organizational problems associated with the Nigeria Blood Transfusion service that is supposed to provide voluntarily donated blood given out of altruism. The net result is that commercial blood donation is the order of the day. This observation is consistent with the findings elsewhere and the suggestion by the World Health Organization (WHO) that commercial remunerated blood donors and family replacement donors are more likely to transmit transfusion-transmissible infections (TTI's) than voluntary donors¹⁶. The low number of voluntary non-remunerated donors may be attributed to several factors- inability to retain first-time voluntary donors, lack of enlightenment of the populace, socio-cultural and religious factors, lack of motivation, logistics problems and poor economic status of the masses. Indeed, there is general apathy surrounding voluntary blood donation. This scenario constitutes a high risk for patients who are in need of blood.

CONCLUSION:

The prevalence of HCV in the private blood banking sector in Osogbo, Southwest Nigeria is 2.07%. There was no relationship between blood groups, age and gender; and infection with HCV in the study.

Based on our findings, it is recommended, therefore that: screening of prospective blood donors for HCV as a transfusion transmissible infection should be made mandatory in all private and public blood banks alike while efforts should be geared towards evolving a sustainable register of voluntary, non-remunerated donors for the nation through strengthening of National Blood Transfusion Services (NBTS). Periodic study to investigate transfusion transmissible infections is required to enable safety reviews of the blood supply. There is urgent need for renewed intensification of preventive programmes aimed at high risk behavioral change.

Finally, establishment of screening centers at state level for private operators will help in ensuring adherence to stringent screening process and ultimately assure safety of blood units from HCV and other TTIs. This will only be sustainable if backed with local

legislation at states houses of assembly in Nigeria. The ultimate aim of every health care system is to provide solution to the overriding problem of disease control.

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