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Incidence and Factors Associated with Hepatitis B Virus Infection Among Blood Donors in Sinnar State- Sudan.

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Abstract

This study was done in Sinnar- Central blood bank, Sinnar State- Sudan. Blood sample collected from apparent healthy blood donor during period of sample collection six months (October 2021-march 2022). This study aim to detect the incidence and factors associated with viral hepatitis (HBV&HCV) infections among blood donors in Sinnar State –Sudan. We conducted Hepatitis B surface antigen test strip and HCV Ab, as step to detect the infections among blood donors at the laboratories for central blood bank in Sinnar and confirmatory test of The HBsAg was analyzed by using sandwich ELISA in National Health Laboratory in Khartoum. The results of this study were analyzed statistically using the frequency and one sample T-test to find the significance of probability level according to SPSS ver20 program. (P) Value < 0.05 was considered significant. Among 7200 volunteer blood donors during sample collection (6 months), there were 315 blood donors were positive by screening strip test, from all positive screening 107 included this study as cases and 78 negative blood donors were representing as control. Positive screening blood donors were included (100%) positive for HBsAg confirmatory test and highly significant HBsAg level ($p<0.000$), 0(0%) for HCV Ab, the infection of HCV not detected among blood donors during this study. Percentage of infection was found to be high incidence in younger, high percentage at age group (18-28) years, also in West River Nile area, rural place, primary education and married blood donors.

Key-Words: blood donors, viral hepatitis, Incidence, confirmatory, frequency.

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Introduction

Infections with hepatitis B and C are serious public health issues in developing nations (Alick 2015). Hepatitis B virus (HBV) infections are thought to have affected two billion people globally; of these, over 350 million are chronic carriers of the virus, primarily found in Asia, Africa, and China. HBV can lead to hepatitis by infecting the liver. The term hepatitis merely refers to "liver inflammation." Liu, Hou, and others, 2005) Worldwide, an estimated 257 million people have hepatitis B and 71 million people have chronic hepatitis C infections (WHO, 2009). Hepatitis C and B together are thought to be responsible for 1.34 million deaths per year, and viral hepatitis is currently the seventh greatest cause of death worldwide, surpassing HIV and malaria (Lozano, Naghavi et al. 2012). The World Health Organization (WHO) estimates that 60 million of the 325 million individuals with chronic HBV in 2015 were African Americans. Furthermore, liver cancers caused by persistent HBV infection take approximately 600,000 lives yearly. Sub-Saharan Africans are experiencing a faster rate of liver cancer development at a younger age compared to Asians and Caucasians (Eko Mbä JM 2018). When blood donors are asymptomatic carriers who test negative for HBsAg, there is still a chance of contracting HBV from giving blood (Hou, Liu et al. 2005). Additionally, the hepatitis B virus causes a highly contagious infectious disease that can be transmitted from mother to child through blood transfusions, breastfeeding, and pregnancy. Hepatitis B virus (HBV) infection is still a serious public health concern even though there is a strong vaccine for it. In Sub-Saharan Africa, chronic HBV causes a considerable number of deaths in people regardless of age, gender, or socioeconomic status (Eko Mbä JM 2018). Out of 3 million infected populations, 1.1 million people die each year from HBV and HCV infections (Akhondi, August 7, 2023). Because blood donors are routinely screened for the hepatitis B surface antigen (HBsAg), the incidence of transfusion-transmitted hepatitis B has steadily decreased over the last 40 years (Torbenson and Thomas 2002). As per Amini Kafi-abad, Rezvan et al. (2009), the most common viral infection transmitted through transfusion is still hepatitis B virus (HBV). There are still cases of post-transfusion HBV infection being reported even though all blood donations are routinely tested for HBsAg, a clinical marker of transmissible HBV (Norder, Hammas et al. 1992). (Candotti and Allain 2009) Hepatitis B is preventable through vaccination, and the seroprevalence of HBV and HCV was highest in African countries compared to other continents, primarily the West African region, with arrangements of 10.0% to 14.96% and 1.5% to 8.69%, respectively.

Material and method:

This was case control study among (7200) volunteer blood donors during study (6 month); there were 315 (2.3%) positive HBV screening, including 185 blood donors apparent healthy. 107 of them were hepatitis B positive blood donors representing the case group, and 78 hepatitis B negative blood donors as a control. They were recruited to detect incidence of viral hepatitis and aim to determine its causes. This study was done in Sinnar, State- Sudan. Sinnar- Central Blood Bank. Study population were Blood Donors in Sinnar Central blood bank, age ranged between 18-48years, and after samples examination infected blood donor were showed their results for more medical care. This study approved by ethical committee of Gezira University-faculty of Medicine. Ministry of health-Sinnar state, hospital administrations agreement considered. All subjects of this study give formal written consent to participant. Data collected through a well-constructed questionnaire; include the personal information and health states of blood donors. Blood sample collected from apparent healthy blood donor during period of study 6 months (October 2021-march 2022). Under hygienic conditions, 2ml of blood were collected and allowed to clot and serum was separated in plane container kept frozen (-20°C) for confirmatory test and hepatitis screening tests. Healthy apparent adult male passed first clinical examination of blood donor by physician, were recruited. Blood donor with history of jaundice or liver disorders did not involve in this study, were excluded. The confirmatory test of HBsAg was analyzed by using sandwich ELISA.

Result:

Data analyzed by the statistical package of social science (SPSS) program version 20. Data and values presented as Frequency and percentage of all measured variables. Infection of viral hepatitis compared with distribution of sociodemographic data and past medical history data of study population. A total of 7,200 donors were screened all were males and among them, 315 donors were found seropositive screening strips for HBV giving the incidence of 4.375%. 0 donors were found seropositive for HCV giving a incidence of 0%. Incidence for HBV was statistically highly significant ($P < 0.000$) using the one sample t.test. Incidence of HBV was higher in younger donors as compared to older donors.

Table.1: incidence of HCV and HBV incidence in October.2021-Mach.2022 Sennar State, Sudan

Screening		Frequency	Percent
HBV	Positive	315	4.375
HCV	Negative	7.200	100.0

Table .2: showed the Distribution of viral infection in cases (107) all were positive HBV infection, negative HCV infection and all controls (78) were HBV and HCV negative and all of the study population (185) were HCV negative during this study.

		Control	Case	Total
HBV infection	+ve	0	107	107
	-ve	78	0	78
HCV infection	+ve	0	0	0
	-ve	78	107	185

Confirmatory test of HBV:

The confirmatory test (HBsAg) done to all sero positive screening Blood donors, the result showed that all of them were positive HBsAg test.

In table3 statistical one sample t.test showed high significant of HBsAg load in positive screening blood donors ($p < 0.000$).

Table.4 :

	N	Mean± Std. Deviation	P. v
HBsAg	107	2.6± 0.65	0/000

Distribution of sociodemographic data of study population

Table5 showed that a total of 107 infected blood donors were included in the study and 78 uninfected blood donors were conscripted as controls, the total populations of study were 185 the age of cases and controls ranged between 18-48 years. Seroprevelince of HBV was higher in

younger donors (18-28 years) 51(47.661%) as compared to other case age (29-38years) 44 (41.12%), And (39-48years) 12(11.22%). Also infection was higher in the blood donors were lived in West River Nile of Sinnar 52(48.59%) as compared to other case residence, primary education blood donors was higher infected than other 57(53.27%), also free work job was higher infected than other jobs 74(69.16%). the married blood donors were infected higher than unmarried blood donors 59(55.14%) and the blood donors were higher infected in rural area than urban one 61(57.01%).

Table.5: Distribution of sociodemographic data of study population

		Control no78		Case no107		Total no185	
		N	%	N	%	N	%
Age	18-28	47	60.25	51	47.66	98	52.97
	29-38	20	25.65	44	41.12	64	34.59
	39-48	11	14.10	12	11.22	23	12.43
married status	Yes	46	58.97	59	55.14	105	56.76
	No	32	41.03	48	44.86	80	43.24
residence site	Town	32	41.02	38	35.52	70	37.84
	East River Nile	12	15.39	17	15.89	29	15.68
	West River Nile	34	43.59	52	48.59	86	46.49
Education	Primary	44	56.41	57	53.27	101	54.59
	Secondary	30	38.46	33	30.84	63	34.05
	high education	4	5.13	17	15.89	21	11.35
Job	Farmer	34	43.59	24	22.43	58	31.35
	Employer	11	14.10	9	8.41	20	10.81
	free work	33	42.31	74	69.16	107	57.84
residence environment	Urban	29	37.18	46	42.99	75	40.54
	Rural	49	62.82	61	57.01	110	59.46

Table.6: showed the distribution of medical history data of cases and controls of study population. The frequency of this data showed that there was no relation between smoke states,

drugs take, Alcohol take, Blood transfusion and blood donation among cases compared with controls.

Table.6: Past medical history data:

		Control No78		Case No107		Total No185	
		No	%	No	%	No	%
smoke status	Yes	48	61.54	36	33.65	84	45.41
	No	30	38.46	71	66.36	101	54.59
Drugs take	Yes	0	0	2	1.87	2	1.08
	No	78	100	105	98.13	183	98.91
Alcohol take	Yes	8	10.26	13	12.15	21	11.35
	No	70	89.74	94	87.85	164	88.65
Blood Transfusion	Yes	6	7.69	1	0.93	7	3.78
	No	72	92.31	106	99.07	178	96.22
Blood Donation	Yes	6	7.69	25	23.36	31	16.77
	No	72	92.31	82	76.63	154	83.24

Discussion:

In this study the incidence of HBV was higher in young blood donor than other age which consistently with the finding of high prevalence of HBV infection in Zambia a study done in Lewanika General Hospital in Mongu, Western Province, Zambia, The result showed highest HBsAg prevalence of 6.74% amongst blood donors in the age range 16-35 years([Alick 2015](#)), in several studies among blood donors on the wide world, the result showed that young people were higher infected than older one but there were many variations in the causes and reasons of this increased level. Also in Gabon HBsAg seroprevalence was significantly higher in donors of the age group 25-35 years old([Eko Mba JM 2018](#)) also study in china the epidemiological characteristics of HBV susceptibility in 1-29 years old young people in China in 2006 and 2014

were showed the HBV susceptible proportion mainly concentrated in 15-29 years old people([Zheng, Wang et al. 2017](#)). Unexpectedly, we observed high incidence of HBV between the married blood donors rather than unmarried blood donors. Also there was no relation between the alcohol abused, smoking, drug taken and blood transfusion or blood donation to HBV or HCV infection in this study. primary education blood donors was higher infected than other also blood donors were higher infected in rural area than urban one this mean that lower education is compared with infection similar of the result research of South Kivu in the Democratic Republic of Congo showed that General knowledge on blood safety is very low in the first link in the chain transfusion (blood donors) and was discussed that A good education of this population conducted by the transfusion service reinforced building (training and support) is needed ([Kabinda, Michèle et al. 2014](#)).

Conclusions:

The study showed High incidence of infection of HBV among young blood donors in sinnar, sinnar-state, central blood bank.

There was relation between high frequency of HBV infection and blood donors from rural area, have free work job, the blood donors were lived in West River Nil of Sinnar, primary educations and married blood donors all were infected higher than other blood donors(control).

There was no relation between smoke states, drugs take, alcohol take, blood transfusion and blood donation among cases compared with controls.

Recommendations

Further studies are recommended among blood donors in Sinnar-State population in order to know more about incidence of HBV and HCV infections in sinnar state and to study the epidemiology of both diseases.

It is also recommended to perform confirmatory tests for both anti-HCV and HBsAg to confirm the rate of positive cases in Sinnar Hospital Blood Bank.

There is urgent need for prevention programme in Sinnar State. aimed to reduce high risk of more transfusion-transmitted viral infections and more liver disease among blood donors.

Prospective studies are needed to find out the general causes of high infection among young people to control of these causes.

Prospective special studies are needed to find out the relationship between high frequency of HBV infection in young blood donor and parental transmission, restricting mothers which have normal labor in house without medical care or clinical examination for viral screening,.particularly most of mothers in Sudan are deliveries in their houses.

People need precepts in the spread, transmission and prevention of viral infections, particularly in rural area of sinnar state.

References

Akhondi., A. Z. H. (August 7, 2023). "Viral Hepatitis." National liberary of medicine.

Alick, m. N., S and Inambwae,M (2015). "Seroprevalence of Hepatitis B and C Virus in Blood Donors at Lewanika General Hospital, Mongu, Western Province, Zambia." Medical and Health Research 1(1): 80-84.

Amini Kafi- abad, S., H. Rezvan, H. Abolghasemi and A. Talebian (2009). "Prevalence and trends of human immunodeficiency virus, hepatitis B virus, and hepatitis C virus among blood donors in Iran, 2004 through 2007." Transfusion 49(10): 2214-2220.

Candotti, D. and J.-P. Allain (2009). "Transfusion-transmitted hepatitis B virus infection." Journal of hepatology 51(4): 798-809.

Eko Mba JM, B. C., Ntsame Ndong JM, Mombo LE, Bengone C, Mouelet Migolet G, M'batchi B, Kosiorek HE, Butterfield RJ, Roberts LR, Borad MJ, Nagalo BM (2018). "Prevalent hepatitis B surface antigen among first-time blood donors in Gabon." PLoS One 13(13(4)).

Hou, J., Z. Liu and F. Gu (2005). "Epidemiology and Prevention of Hepatitis B Virus Infection." Int J Med Sci **2**(1): 50-57.

Kabinda, J. M., D. W. Michèle, P. Donnen, S. A. Miyanga and J. Van den Ende (2014). "Factors for viral infection in blood donors of South Kivu in the Democratic Republic of Congo." Pan Afr Med J **19**: 385.

Lozano, R., M. Naghavi, K. Foreman, S. Lim, K. Shibuya, V. Aboyans, J. Abraham, T. Adair, R. Aggarwal and S. Y. Ahn (2012). "Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010." The lancet **380**(9859): 2095-2128.

Norder, H., B. Hammas, J. Larsen, K. Skaug and L. Magnus (1992). Detection of HBV DNA by PCR in serum from an HBsAg negative blood donor implicated in cases of post-transfusion hepatitis B. Chronically Evolving Viral Hepatitis, Springer: 116-118.

Organization, W. H. (2009). "WHO Blood Safety Indicators 2007." Geneva, Switzerland.

Organization, W. H. (2017). Global hepatitis report 2017, World Health Organization.

Torbenson, M. and D. L. Thomas (2002). "Occult hepatitis B." The Lancet infectious diseases **2**(8): 479-486.

Zheng, H., F. Z. Wang, G. M. Zhang, N. Miao, X. J. Sun and F. Q. Cui (2017). "[The epidemiological characteristics of HBV susceptibility in 1-29 years old young people in China in 2006 and 2014: based on the national sero-survey data analysis]." Zhonghua Yu Fang Yi Xue Za Zhi **51**(7): 581-586.