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Disproportionate HBsAg seroprevalence rates among healthy blood donors in six health care facilities in Sierra Leone, 2012-2016

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Abstract

Background: Viral hepatitis is a disease condition caused by five distinct types of hepatitis viruses including hepatitis B Virus (HBV). HBV causes a range of acute and chronic liver diseases that sometimes lead to death. There are about 400 million HBV infected people worldwide many of them in Asia and Africa where the infection is endemic.

Methods: We collected and later analyzed anonymized laboratory results from blood banks at Connaught Hospital, PCMH, 34th Regiment Military Hospital, Aberdeen Women Hospital, Lumley Government Hospital and the Emergency Surgical Hospital of healthy blood donors. All persons whose data were used in this study were healthy blood donors between the ages 18-55 years and had only gone to these blood bank facilities to donate blood.

Results: Out of 43,163 persons screened for various blood infections, 6,564 persons were positive for HBsAg with a seroprevalence rate of 15.2% (95% CI: 14.87-15.55). There were 37,060 males tested and 6103 females tested and 5735 males (15.5%) and 829 females (13.6%) were positive for HBsAg. There was gender, yearly and health care facility difference (P<0.0001) for HBsAg seroprevalence cases recorded in this study. The highest HBsAg seroprevalence rate for the period under review was recorded in 2013. We observed disproportionate differences in HBsAg seroprevalence rates for gender, yearly and health care facility (P<0.0001) for the period under review.

Conclusion: A seroprevalence of 15.2% among healthy volunteers indicate that HBV is a serious problem in Sierra Leone. There is a need for an urgent HBV vaccination coverage in Sierra Leone. A randomized population-based study with healthy volunteers is recommended for future seroprevalence studies on HBV.

Keywords: Viral Hepatitis; HBsAg; Seroprevalence; Freetown; Sierra Leone

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INTRODUCTION

Viral hepatitis is a disease condition caused by five distinct types of hepatitis viruses including hepatitis B which is the most important that causes a range of acute and chronic liver diseases that sometimes lead to death. It is estimated that 10% of Human Immunodeficiency Virus (HIV) infected patients are coinfected with Hepatitis B Virus (HBV) worldwide and about 400 million people many of them in Asia and Africa where the virus is endemic(Thio 2009; Hoffmann and Thio 2007; Kourtis et al. 2012). An estimated 500,000-1,000,000 persons die annually of HBV-related liver disease(Maynard, Kane, and Hadler 2011) mostly in sub-Saharan Africa, Asia (except Japan and India), Middle East, South America and the Pacific Island Groups(Maynard, Kane, and Hadler 2011). In high HBV endemic countries the seroprevalence rate can be as high as 25%(Hoffmann and Thio 2007). About 30% of the world's population show serological evidence of a current or past infection with HBV(Trépo, Chan, and Lok 2014). Despite being a neglected disease, HBV affects about 400 million persons globally while HIV which is one of the 'big three' of infectious diseases (with TB and malaria) affects under 50 million persons globally(Kourtis et al. 2012; Thio 2009). HIV, on the other hand, has a pandemic status but HBV does not.

The transmission of HBV follows the transmission paths of HIV including perinatally or from a mother to an unborn child; through sexual contact(involving both homosexual and heterosexual contacts); parenteral routes including transfusion of blood and blood products, shared needles, tattoos, acupuncture traditional scarifications or initiations and bed bugs. In addition, HBV, In closed communities, can easily be transmitted from child-to-child(horizontal transmission) and from person to person.

In resource-constrained countries such as Sierra Leone, HBV is endemic and typically has a prevalence rate of over 8%(Schweitzer et al. 2015). Despite evidence of a serious HBV problem, routine surveillance in demographic health surveys, is lacking. Blood screening for HBsAg is routinely done to prevent the transfusion of HBV to patients in need of a blood transfussion. Despite the universal screening of blood before transfusion, literature on HBsAg prevalence among healthy blood donors in Sierra Leone is scanty.

In this study, we collated retrospective data collected from safe blood donations in six hospitals in Freetown, Sierra Leone for HBsAg.

METHODS

We collected and later analysed anonymized laboratory results from blood banks at Connaught Hospital, PCMH, 34th Regiment Military Hospital, Aberdeen Women Hospital, Lumley Government Hospital and the Emergency Surgical Hospital of healthy blood donors (Fig.1). The blood banks of these health care facilities screened blood products for transfusion transmissible infections including HBV. The healthy donors were of age range 15-55years and were assessed between January 2012 to December 2016. The data were analyzed using vassarstats (http://vassarstats.net/) online statistical software. Chi squared tests were computed to show differences on HBsAg infection by sex and p-values ≤0.05 were considered statistically significant. All analyses were done at 95% confidence interval.

RESULTS

This study analyzed the laboratory results of HBsAg persons obtained from the six hospitals in Freetown, Sierra Leone between 2012 and 2016. Out of 43,163 persons screened for HBsAg, 6,564 persons were positive with a seroprevalence rate of 15.2% (95% CI: 14.87-15.55). There was gender, yearly and health care facility difference (P<0.05) for HBsAg seroprevalence cases recorded in this study (Table 1.0).

Emergency Surgical Centre recorded the highest facility level HBsAg rate of 33.2% and also recorded the highest seroprevalence among males of 34.1% for the period under review. Similarly, Lumley Government Hospital recorded the second highest facility based seroprevalence of 24.1% and also recorded the highest rate among women of

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31.5%(Fig.1) The catchment of Lumley Hospital and Emergency Surgical Centre and the Aberdeen Women Centre are endemic for prostitution and horizontal transmission is more probable for the high rates in these areas.

Table 1.0: Overall HBsAg in Blood Donors from Six Hospitals in Freetown, 2012-2016

Health care facility	Mt	Mp(%)	Ft	Fp (%)	HBsAg per health care facility N (%)	p-value
Connaught Hospital	6,619	662(10)	1034	125(12.1%)	787(12)	0.04
PCMH	15259	1769(11.6)	2783	187(6.7)	1956(10.8)	0.0001
Lumley Gov. Hospital	644	130(20.2)	333	105(31.5)	235(24.1)	0.0001
34 Military Hospital	5579	234(4.2)	434	51(11.8)	285(4.7)	0.0001
Aberdeen Women Centre	872	182(20.9)	314	37(11.8)	219(18.5)	0.0003
Emergency Surgical Centre	8087	2758(34.1)	1205	324(26.9)	3082(33.2)	0.0001
Total Persons Screened	37060	5735(15.47)	6103	829(13.58)	6564(15.2)	0.0001

Mt (males tested); Mp (males positive); Ft (females tested); Fp (females positive)

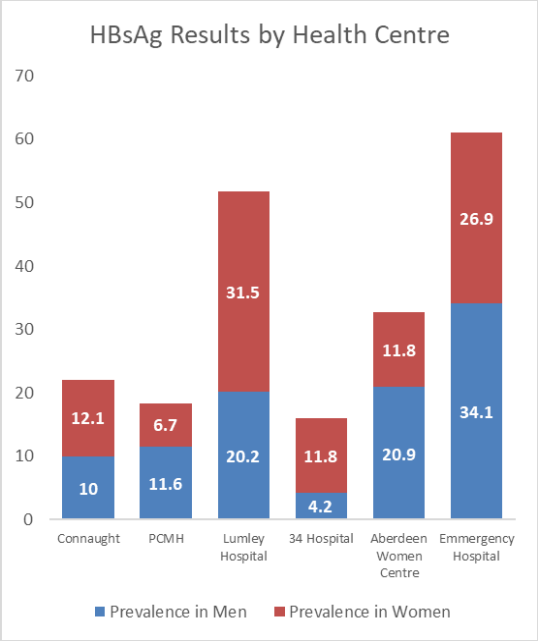

Fig. 1: Seroprevalence of HBsAg by Health Centre in Freetown

The highest yearly HBsAg seroprevalence rate for the period under review was recorded in 2013. The HBsAg seroprevalence rate for males and females in 2013 were 18.8% and 30.8% respectively while 2015 had the lowest HBsAg seroprevalence rate in this study (Fig. 2). The HBsAg seroprevalence rate for males and females in 2015 were 11.7% and 6.7% respectively. HBsAg seroprevalence rate reduced significantly ($P<0.05$) in females in 2014 and maintained a low rate till 2016. Males also experienced a marked reduction in HBsAg seroprevalence rate in 2015 and 2016 (Fig.2).

Moreover, we observed disproportionate differences in HBsAg seroprevalence rates for gender, yearly and health care facility ($P<0.0001$) for the period under review. Male blood donors recorded the highest (15.47%) HBsAg seroprevalence rate in this study. Our HBsAg rate is similar to the rate of 15% in males and 13% in females reported among blood donors(n=147) at Masanga in the Tonkolili District, Northern, Sierra Leone (García-Tardón et al. 2017). Similarly, in Bo,

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Southern Sierra Leone, a seroprevalence of 15.5% among febrile males aged five years or above(n=330) and 12.6% among febrile females(n=530) has been recently reported(Ansumana et al. 2018).

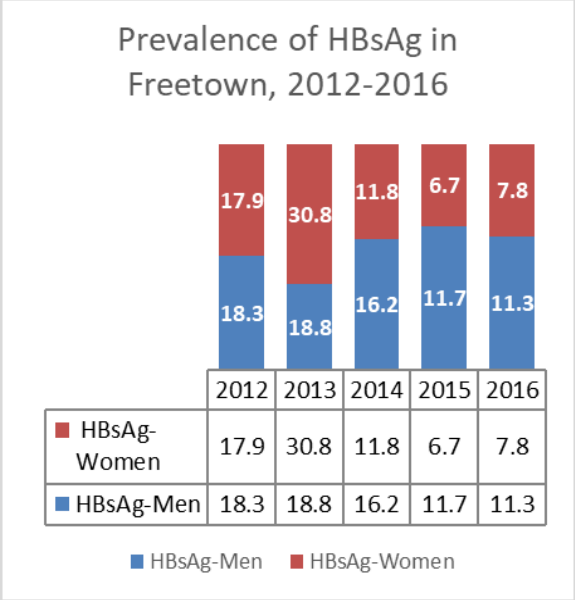

Fig. 2: Seroprevalence of HBsAg in Freetown

Countries with HBsAg higher than 8% are considered to be having a higher burden of the disease(Ott et al. 2012). From the year 2005 seroprevalence of HBV in Sierra Leone has ranged from 6%(I. M. Wurie, Wurie, and Gevao 2005) to 47%(Adesida SA, Tamba GF, Sahr F 2010; Ansumana et al. 2018; Kangbai and Koroma 2013; I. Wurie, Smart, and Brown 2008; Zoker, Sundufu, and Jacobsen 2017). Vaccination remains the core prevention strategy for HBV(La Fauci et al. 2016), but accessibility to HBV vaccines remains a serious concern. HBV vaccine is not generally provided for healthcare workers at risk of occupational exposure to the virus or prostitutes hawking on the streets in Sierra Leone.

Because of the high cost for treating HBV and the dietary restrictions that may be involved, not everyone infected is treated early. Infected women may transmit vertically to their children who end up been chronically infected with HBV. To prevent vertical transmission and horizontal transmission at birth; universal, birth dose policy is in place in many countries(Miyahara et al. 2016; Wiesen et al. 2016; Lahariya, Subramanya, and Sosler 2013; Creati et al. 2007). Birth dose policy, in practice for over a decade, involves providing hepatitis B vaccine to a neonate within 24 hours of delivery(Miyahara et al. 2016).

However, there is no universal birth dose policy in Sierra Leone for HBV vaccine, which could prevent early horizontal transmission or perinatal transmission of the virus. The earliest HBV vaccine is given six weeks after birth. Early transmission(at birth) has been implicated as the main way by which HBV is perpetuated in endemic countries(Monique I Andersson, Ruma Rajbhandari et al. 2015).

Moreover, the 2014/2015 Ebola crisis interrupted routine vaccination programs in Sierra Leone(Brolin Ribacke et al. 2016). Many children who should have been vaccinated against HBV and other infections remain vulnerable to preventable diseases. "Catch-up" vaccination days may improve public health, but they will not address the health needs of children and adults who have already developed chronic HBV infections.

This study had several limitations. Data used were obtained secondarily from hospital records at the blood bank in Freetown. Though the data represents prevalence rate for healthy volunteers, it was not randomized. An assessment of HBsAg during the demographic health survey is recommended to obtain an outcome from a randomly selected range of healthy volunteers. Despite these limitations, this study highlights that HBV is a serious burden of disease in Freetown, Sierra Leone.

There is a need to increase vaccination coverage especially for at-risk populations including healthcare workers.

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