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Prevalence and Associations of Hepatitis B Virus Infection among Students of Traditional Schools, East Nile Locality, Khartoum, Sudan

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ABSTRACT

Background: Hepatitis B virus (HBV) infection is a major health problem causing considerable morbidity and mortality from both acute infection and chronic sequels including chronic hepatitis, cirrhosis and hepatocellular cancer. **Aim:** To estimate the prevalence of hepatitis B virus infection and the associated factors among children and adolescent in the traditional schools, East Nile locality. **Methods:** Descriptive cross-sectional school-based study. Sero-prevalence survey was conducted among school children and adolescent aged 2–19 years. Total sample of 880 students were tested for Hepatitis B surface antigen (HBsAg) in serum using immune-chromatographic assay. Data were analyzed using IBM statistical package for social sciences version 20 with statistical significance of ($p < 0.05$). **Results:** A total of 4.2% tested positive for HBsAg, (3.2%) among children and (4.3%) among adolescent, this is lower than the reported prevalence in the country. There was no significant association between the pre-determined risk factors and hepatitis B virus infection in the study group. **Conclusion:** The prevalence of HBV infections in this study was lower than the overall prevalence in Sudan. Further studies are needed to evaluate the risk factors for hepatitis B virus infection among children and adolescents in Sudan. Hepatitis B virus vaccine should be implemented in the vaccination program for children, in addition to awareness campaigns about the virus and transmission methods.

Keywords: Hepatitis B Virus, Children, Adolescent, Traditional Schools.

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Introduction

Hepatitis B virus (HBV) infection is a major health problem causing considerable morbidity and mortality from both acute infection and chronic sequels including: chronic hepatitis, cirrhosis and hepatocellular cancer. Two billion people show evidence of past or current HBV and over 350 million people are chronic carriers worldwide. Three quarters of the world's population live in areas with high levels of infection (Mudawi *et al.*, 2008). Sub-Saharan Africa has the second largest global burden of chronic carriers of hepatitis B infection after Asia (Christopher *et al.*, 2015). Sudan is an African country with high HBV prevalence of greater than 8% HBsAg-positivity, ranging from 6.8% in central Sudan to 26% in southern Sudan. HBV infection occurs in early childhood in southern Sudan, with the infection increasing with age in northern Sudan (Mukhlid *et al.*, 2013).

Annually, there are almost 2 million new infections in children younger than 5 years worldwide, mostly through mother-to-child transmission, and early horizontal transmission (Giuseppe *et al.*, 2019). There are several modes of transmission of HBV infection including: exposure to infectious blood or body fluids. In areas where the infection is common the most frequent method by which hepatitis B is acquired is vertical transmission at the time of birth or from close contact with other people during childhood, while in other areas where the infection is uncommon, intravenous drug use and sexual intercourse are the most frequent routes of infection. In addition to that, there are other risk factors including working in healthcare, blood transfusions, and dialysis (Babbiker *et al.*, 2018). This study aim to estimate the prevalence of hepatitis B virus infection and the associated factors among children and adolescent of traditional schools, in the East Nile locality of the state of Khartoum, Sudan.

MATERIALS AND METHODS

Study design:

This was a descriptive cross-sectional school-base study.

Study area:

The study was carried out in traditional schools of Eid-Babiker village, nearly 20 kilometers east Khartoum. These are male-only institutions.

Sampling and Sample size:

All male children and adolescents attending the traditional schools of Eid-Babiker village were included, 880 samples were collected. Consent was obtained for participation in the study and for the blood withdrawal.

Data collection

Socio-demographic data collection

Interview based questionnaire was filled for all participants contain socio-demographic and clinical information such as age, origin of birth and family history, in addition to risk factors for hepatitis B infection were obtain.

Sample collection and processing:

A volume of 3-5 ml blood was collected from each patient through venipuncture technique then displaced into a plain container. Each blood sample was centrifuged at 3000 g for 5 min to serum (Purusotam *et al.*, 2017).

Serum sample were tested for HBsAg at the sites with Humasis HBsAg Card, Humasis Co., Ltd, Republic of Korea. (Relative Sensitivity: 98% (97/98), Relative Specificity: >99% (98/98), Accuracy 99% (195/196)). Humasis HBsAg card is one step in vitro diagnostic test base on an immune-chromatographic assay. It is designed for qualitative determination of Hepatitis B surface antigen (HBsAg) in human serum or plasma specimen.

Data analysis

Data was analyzed by IBM Statistical Package for Social Sciences (SPSS) version 20 in terms of frequency table to estimate prevalence and binary logistic regression test was done to determine the association between the risk factor and hepatitis B infection. A value of 0.05 was used as alpha level of significance.

Results:

Over a period of one month, 880 students were selected for the study. The age range was 2–19 years with a mean 12.42 ± 2.458 years. Out of 880 individual, 62 (7%) were children under the age of 12 while the rest 818 (93%) were adolescents. Shown in Table 1. Of the study population 37 (4.2%) tested positive for HBsAg, of them 2 were children while 35 were adolescents This gives a prevalence figure of (3.2%) in children and (4.3%) in adolescents. The results are shown in Table 2.

Identified risk factors for HBV infection among individual were a personal history of jaundice (21.9%) family history of jaundice (25.3%) and a history of jaundice in a parent (12%). Numerous tools were shared on a large scale including; Cups (57.6%), Nail clippers (40.3%) and Beds (25%). Minority of individual shared Combs (15.7%), Razors (16%) and tooth brushes (6.1%).

Other risk factors included traditions such as whipping in social events (68.2%) and participating in mass circumcision (24.5%). In addition to traditional medical practice including; cupping (31.8 %) and moxibustion (30.2 %).

No association found between the identified risk factors and hepatitis B virus infection among the study participants ($P > 0.05$). Shown in Table 3.

Discussion:

Viral hepatitis poses an important burden on children's health worldwide. Research has shown that hepatitis B virus infection is an important cause of chronic liver disease in children and adolescents (Griselda *et al.*, 2012). Sudan is an African country with high HBsAg prevalence greater than 8%, ranging from 6.8% in central Sudan to 26% in southern Sudan (Mukhlid *et al.*, 2013). However, there is very limited data regarding the prevalence of hepatitis B virus infection among children and adolescent in Sudan.

Our study revealed a low prevalence of hepatitis B virus in comparison to the reported prevalence in Sudan. It is likely that the study population has not been exposed to significant HBV infections risk factors. The prevalence was higher in adolescents but this may be a reflection of their higher representation in the study group compared to younger children.

Table 1: Shows the frequency and percent among the age group.

Age Group	Frequency	Percent
Children	62	7
adolescent	818	93
Total	880	100

Table 2: Shows the prevalence of Hepatitis B virus infection among study population and the two age groups.

HBV infection	Overall	Children	Adolescent
Positive	4.2	3.2	4.3
Total	100	100	100

Table 3: Show the frequency and percent of risk factors and association with Hepatitis B virus infection.

Risk factors	Frequency	Percent	<i>P value</i>
History of jaundice	193	21.9	0.361
Family history of jaundice	223	25.3	0.291
Parents with jaundice	106	12	0.508
Sharing Cups	507	57.6	0.826
Sharing Nail clippers	355	40.3	0.606
Sharing Beds	220	25	0.204
Sharing Combs	138	15.7	0.913
Sharing Razor	141	16	0.181
Sharing Tooth brush	54	6.1	0.765
Whipping in social events	600	68.2	0.859
Mass circumcision	216	24.5	0.13
Moxibustion	266	30.2	0.13
Cupping	280	31.8	0.555

In addition our research did not find a significant relationship between the known risk factors and HBV virus in this group, this may be related to the low prevalence of the virus which in turns reduces the risk of horizontal transmission among the group. Two studies conducted in Sudan revealed higher prevalence of HBsAg. The first study estimated prevalence of hepatitis B virus infection in the Gezira State of Central Sudan, children and adolescent had (12.5%) and (6.5) HBsAg positivity respectively (Mudawi *et al.*, 2008). The second study evaluated hepatitis B virus sero-prevalence among children with cancer, (21.3%) were HBsAg positive (Mohammed *et al.*, 2016). The first study

included only 99 participants which may be too small to reflect on the whole population prevalence. In the second study, children with cancer are highly susceptible to HBV infection due to multiple predisposing factors such as blood transfusion.

In Nigeria adolescent had a relatively low prevalence of HBsAg (3.1%) in compare to this study (4.2%). However, (6.5%) adolescent males were positive for HBsAg which is higher than the findings form this study (4.3%). Christopher *et al* included 420 students in his study, 50% were males.

Lower prevalence of HBsAg observed among children and adolescent from Rio de Janeiro

(1.8%) (LiviaMelo *et al.*, 2014) Senegal (1.1%) (Gora *et al.*, 2019), and South Africa (0.4%) (Prabdial-Sing *et al.*, 2019) when compared to this study. All three countries have a have a national childhood Immunization program that includes HBV immunization.

The frequencies of HBV infections were observed in children (3.2%), this pattern of results is consistent with previous studies conducted in Mexico (Griselda *et al.*, 2012) and Indonesia (Takako U *et al.*, 2010), where HBsAg prevalence was (3.1%) in the two studies. This similarity may attributed to the fact that those countries has low intermediate to high intermediate HBV endemicity levels among the children and adolescents and no national immunization against HBV (J.J. Ott *et al.*, 2012).

Mudawi *et al* reported no significant association between having history of jaundice and HBV infection (Mudawi *et al.*, 2008). Sharing of tooth brush, razor and having history of jaundice were also not significant according to Christopher *et al* (Christopher *et al.*, 2015). We report similar findings with none of the reported risk factors showing statistical significance for the infection.

Conclusions:

In conclusion, relatively low prevalence of HBV infections was observed in children and adolescents of Traditional Schools in East Nile Locality, Sudan. Moreover, none of the reported risk factors were associated with HBV infection. Further research in the community, including females, is needed to ascertain the community prevalence. National immunization against HBV should be funded to reduce the overall risk of this serious health problem.

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