

Full Length Research Paper

Prevalence of Hepatitis B surface antigen and Hepatitis C virus antibodies among pre-surgery screened patients in Khartoum, Central Sudan

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The prevalence of Hepatitis B and C infection varies between different regions of Sudan according to several published reports. The present study is a descriptive hospital-based study aimed to estimate prevalence of Hepatitis B surface antigen and anti-Hepatitis C virus antibodies among 3172 patients undergoing surgery at Al-Shaab Teaching Hospital in Khartoum from April 2008 to April 2011. All patients were screened by rapid chromatography immunoassay for qualitative detection of Hepatitis B surface antigen and anti-Hepatitis C virus antibodies. The mean age of the studied subjects was 44 years; 61.1% of them were males and 38.9% were females. Hepatitis B surface antigen was detected in 156 patients (4.91%), while anti-Hepatitis C virus antibodies were detected in 58 patients (1.82%). The prevalence of Hepatitis B surface antigen is slightly higher in males (5.46%), than females (4.04%); however, it is statistically insignificant ($P= 0.08$). In conclusion, the present study reported a prevalence of Hepatitis B surface antigen which is lower than what has previously been reported in Sudan.

Key words: Hepatitis B virus (HBV), hepatitis C virus (HCV), prevalence, Khartoum, Sudan.

INTRODUCTION

Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are common causes of liver disease globally. The HBV is a major public health challenge due to its worldwide distribution, chronic persistence and complications. Its endemicity ranges from high ($\geq 8\%$) to moderate (2-7%) and low ($< 2\%$) (Margolis et al., 1991; Maynard et al, 1989). The HCV was first identified in 1989 (Houghton, 2009). Infections with HCV are pandemic and the World Health Organization (WHO) estimates a world-wide

prevalence of 3%, most of these cases occur in Africa (Madhava et al., 2002; WHO, 1999). Infection with HBV and HCV is primarily blood borne or parenterally transmitted. Routes of parenteral transmission include contaminated blood and blood products, needle sharing, reuse of contaminated razors by barbers, tattooing devices, haemo-dialysis, acupuncture needles and contaminated medical devices. Other modes of transmission include sexual promiscuity and vertical transmission in the early childhood (Alain et al., 2002; Henderson, 2003; Levine et al., 1994; Ranger-Rogez et al., 2002; Stauber, 2000).

In health care settings, occupational risk for

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Table 1. Prevalence of HBsAg and Anti-HCV among the study group.

Parameter	Study group n (%)	HBsAg n (%)	P value	HCV n (%)	P value
Total patients	3172	156 (4.9)		58 (1.8)	
Male	1939 (61.1)	106 (5.5)	0.08*	35 (1.8)	0.99
Female	1233 (38.9)	50 (4.0)		23 (1.9)	

n= number, *=chi square test.

transmission of HBV and HCV might exist. Transmission could occur from infected patients to staff, patient to patient or infected providers to patients (Alain et al., 2002). In recent years, considerable advances have been made in diagnostic testing for HBV and HCV. These enable rapid blood samples screening for patients and health care staff to minimize the risk of infection.

Previous studies of HBV and HCV epidemiology in Sudan showed different prevalence, from as high as 23% to as low as 0.6% for HCV and a wide range of HBV prevalence were reported (5.6 to 68%) (El-Amin et al., 2007; Elsheikh et al., 2007; McCarthy et al., 1989a). However, most of the reported prevalence in Khartoum State was among pregnant women, haemo-dialysis or patients with liver diseases (El-Amin et al., 2007; Elsheikh et al., 2007; Mudawi et al., 2007a).

The aim of this study was to estimate the prevalence of Hepatitis B surface antigen (HBsAg) and anti-HCV antibodies among patients who undergo different surgical interventions in Al-Shaab Teaching Hospital in Khartoum State. The results could serve as guidelines to future healthcare strategies and vaccination campaigns in Sudan.

MATERIALS AND METHODS

The study was conducted at the department of clinical laboratories, Al-Shaab Teaching Hospital which is tertiary hospital, located in the centre of Khartoum, Sudan. The study involved 3172 patients from all ages and both sexes who were undergoing different surgical interventions from April 2008 to 2011. Ethical approval was obtained from the Ethical Research Committee, Institute of Endemic Diseases, University of Khartoum and a separate permission was taken from the hospital.

All patients were informed about the test. Blood sampling collection was performed using a standard procedure and plasma was used for HBV and anti-HCV antibodies screening. Each patient was screened by rapid chromatography immunoassay for qualitative detection of HBsAg and anti-HCV antibodies to find the carrier status of patients before surgery. The hospital routinely uses commercial HBsAg and HCV test kits, from Standard Diagnostics (SD-South Korea Inc). Tests were performed in accordance with the manufacturer's instructions. The HBsAg SD BIOLINE kit has both sensitivity and specificity of 99%, while the HCV SD BIOLINE kit has a sensitivity of 100% and specificity of 99.4%. Moreover, samples which were positive for either HBsAg or anti-HCV antibodies had been re-tested for second time by the same method. Samples repeatedly reactive for HBsAg or anti-HCV antibodies were considered positive.

Statistical analysis was done using SPSS for Windows version 11.5. The difference between categorical variables was tested using Chi square test. The P value was considered significant when it is less than or equal to 0.05.

RESULTS

The present study included a total of 3172 patients undergoing surgical intervention at Al-Shaab Teaching Hospital in Khartoum; the mean age was 44 years with an age range of 1 month – 92 years. Out of the studied group, 1939 (61.1%) were males and 1233 (38.9%) were females. The HBsAg was detected in 156 patients (4.91%, 95% CI 4.2%-5.7%), while anti-HCV antibodies were detected in 58 patients (1.82%, 95% CI 1.4%-2.4%). The prevalence of HBsAg is slightly higher in males 106 (5.5%, 95% CI 4.5%-5.6%), than females 50 (4.0%, 95% CI 3.1%- 5.3%); however, it is statistically insignificant ($P = 0.08$). The estimated prevalence of HBsAg is higher than that of anti-HCV antibodies. Table 1 shows the prevalence of HBsAg and Anti-HCV in males and females of the study group.

DISCUSSION

Most descriptions of HBV and HCV epidemiology rely mainly upon HBsAg and HCV sero-prevalence studies. These studies are typically cross-sectional in design and are done in selected populations e.g. haemo-dialysis patients, blood donors or patients with chronic liver disease which are not representative of the whole community in which they reside. Population-based studies representative of an entire community are far more informative, but this kind of study is not feasible in most parts of the world (Shepard et al., 2005). Previous studies of HBsAg and HCV sero-prevalence in Khartoum State were merely done in selected subjects such as pregnant women representing adult females in child bearing age. Other studies were done in haemo-dialysis patients who have an increased risk to blood-borne infections due to the frequent dialysis. The present study estimates the prevalence of HBsAg and HCV among 3172 patients from all ages and both sexes who underwent different surgical interventions at Al-Shaab Teaching Hospital in Khartoum State. The results showed

a moderate prevalence of HBsAg (4.91%), which could be compared with other studies from Sudan. Elsheikh et al. (2007) reported a 5.6% HBsAg positivity in 728 pregnant women in Khartoum State, which is similar but slightly higher than our result. On the other hand, some other studies in Sudan reported a higher prevalence of HBV than this study. Recent study in Nyala, South Dar Fur region revealed 6.2% HBsAg prevalence in blood donors (Abou et al., 2009). A survey in Gezira State of Central Sudan found 6.9% HBsAg positivity in the general population (Mudawi et al., 2007b). Moreover, another study reported 7.0% prevalence in healthy controls from Gezira and North Kordofan States (Omer et al., 2001). Earlier reports showed a high prevalence of HBV infection in Sudan. In 1989 a study reported prevalence of 18.7% HBsAg positivity after a survey involved two rural villages in Gezira State (Hyams et al., 1989). Furthermore, in 1992 another study in the Gezira State reported HBsAg positivity of 17.3 and 12.1% in blood donors and laboratory technical staff respectively (Elshafie, 1992). In 1989 McCarthy et al. (1989a, 1989b) reported two studies, one detected HBV markers in 68% of sexually active heterosexuals on the coast of Sudan (Port Sudan and Suakin), the other study found that 78% of male soldiers had serological evidence of past hepatitis B infection. Moreover, McCarthy et al. (1994) reported that HBsAg was detected in 26% of out-patients in Juba city, southern Sudan. The probable explanation for the lower prevalence of HBsAg in this study in comparison to the previous reports in Khartoum; was the improvement of blood screening procedures and the introduction of the HBV vaccination program.

The prevalence of HCV infection was lower in various regions of Sudan than that of HBV infection. The present study reports a 1.82% anti-HCV sero-positivity which is closer to other previous studies in Sudan. A study by Mudawi et al. (2007c) detected a 2.2% prevalence of anti-HCV antibodies in Gezira State. Other studies reported a prevalence of 3 and 1.5% in southern and two different regions of Sudan respectively (McCarthy et al., 1994; Omer et al., 2001). However, a study in Khartoum State reported a lower prevalence of 0.6% of anti-HCV among pregnant women (Elsheikh et al., 2007). Another study in Dar Fur, western Sudan also reported a low prevalence of 0.65% (Abou et al., 2009). Higher prevalence, 4.5 and 23.7% were reported in Khartoum among patients with hepatosplenic schistosomiasis and haemodialysis patients respectively (El-Amin et al., 2007; Mudawi et al., 2007a). Similar prevalence to this study was reported in other countries, 1.7% in Yemen, 1.7% in Ethiopia and 1.8% in USA (Alter et al., 1999; Bajubair et al., 2008; Gelaw and Mengistu, 2007). Egypt the northern neighbouring country to Sudan reported the highest HCV seroprevalence in the world, 12 to 31%, transmission has been attributed to contaminated glass syringes used in nationwide schistosomiasis treatment campaigns from 1960 to 1987 (Frank et al., 2000; Lehman and Wilson, 2009;

Mohamed et al., 1996; Youssef et al., 2009). However, in Sudan no association was found between HCV infection and schistosomiasis or with parenteral antischistosomal therapy (Mudawi et al., 2007a).

In conclusion, this study shows the prevalence of HBsAg and anti-HCV antibodies in 3172 patients who underwent different surgical interventions, which is more representative for the population of Khartoum State than the previous studies. This study reports a lower HBsAg prevalence.

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REFERENCES

- Abou MA, Eltahir YM, Ali AS (2009). Seroprevalence of hepatitis B virus and hepatitis C virus among blood donors in Nyala, South Dar Fur, Sudan. *Virol. J.* 6:146.
- Alain S, Loustaud-Ratti V, Dubois F, Bret MD, Rogez S, Vidal E, Denis F (2002). Seroreversion from hepatitis C after needlestick injury. *Clin. Infect. Dis.* 34:717-719.
- Alter MJ, Kruszon-Moran D, Nainan OV, McQuillan GM, Gao F, Moyer LA, Kaslow RA, Margolis HS (1999). The prevalence of hepatitis C virus infection in the United States, 1988 through 1994. *N. Engl. J. Med.* 341:556-562.
- Bajubair MA, Elrub AA, Bather G (2008). Hepatic viral infections in Yemen between 2000-2005. *Saudi. Med. J.* 29:871-874.
- El-Amin HH, Osman EM, Mekki MO, Abdelraheem MB, Ismail MO, Yousif ME, Abass AM, El-haj HS, Ammar HK (2007). Hepatitis C virus infection in haemodialysis patients in Sudan: two centers' report. *Saudi J. Kidney Dis. Transpl.* 18:101-106.
- Elshafie SS (1992). The prevalence of hepatitis B surface antigen in the Gezira (Sudan). *Afr. J. Med. Med. Sci.* 21:61-63.
- Elsheikh RM, Daak AA, Elsheikh MA, Karsany MS, Adam I (2007). Hepatitis B virus and hepatitis C virus in pregnant Sudanese women. *Virol. J.* 4:104.
- Frank C, Mohamed MK, Strickland GT, Lavanchy D, Arthur RR, Magder LS, El Khoby T, Abdel-Wahab Y, AlyOhn ES, Anwar W, others (2000). The role of parenteral antischistosomal therapy in the spread of hepatitis C virus in Egypt. *Lancet* 355:887-891.
- Gelaw B, Mengistu Y (2007). The prevalence of HBV, HCV and malaria parasites among blood donors in Amhara and Tigray regional States. *Ethiop. J. Health Dev.* 22(1):3-7.
- Henderson DK (2003). Managing occupational risks for hepatitis C transmission in the health care setting. *Clin. Microbiol. Rev.* 16:546-568.
- Houghton M (2009). The long and winding road leading to the identification of the hepatitis C virus. *J. Hepatol.* 51:939-948.
- Hyams KC, al-Arabi MA, al-Tagani AA, Messiter JF, al-Gaali AA, George JF (1989). Epidemiology of hepatitis B in the Gezira region of Sudan. *Am. J. Trop. Med. Hyg.* 40:200-206.
- Lehman EM, Wilson ML (2009). Epidemic hepatitis C virus infection in Egypt: estimates of past incidence and future morbidity and mortality. *J. Viral Hepat.* 16:650-658.
- Levine OS, Vlahov D, Nelson KE (1994). Epidemiology of hepatitis B virus infections among injecting drug users: seroprevalence, risk factors and viral infections. *Epidemiol. Rev.* 16:418-436.
- Madhava V, Burgess C, Drucker E (2002). Epidemiology of chronic hepatitis C virus infection in sub-Saharan Africa. *Lancet Infect. Dis.* 2:293-302.
- Margolis HS, Alter MJ, Hadler SC (1991). Hepatitis B: evolving

- epidemiology and implications for control. *Semin. Liver Dis.* 11:84-92.
- Maynard JE, Kane MA, Hadler SC (1989). Global control of hepatitis B through vaccination: role of hepatitis B vaccine in the Expanded Programme on Immunization. *Rev. Infect. Dis.* 11 Suppl., 3: S574-578.
- McCarthy MC, Burans JP, Constantine NT, el-Hag AA, el-Tayeb ME, el-Dabi MA, Fahkry JG, Woody JN, Hyams KC (1989a). Hepatitis B and HIV in Sudan: a serosurvey for hepatitis B and human immunodeficiency virus antibodies among sexually active heterosexuals. *Am. J. Trop. Med. Hyg.* 41:726-731.
- McCarthy MC, el-Tigani A, Khalid IO, Hyams KC (1994). Hepatitis B and C in Juba, Southern Sudan: results of a serosurvey. *Trans. R. Soc. Trop. Med. Hyg.* 88:534-536.
- McCarthy MC, Hyams KC, el-Tigani el-Hag A , el-Dabi MA, el-Sadig el-Tayeb M, Khalid IO, George JF, Constantine NT and Woody JN (1989b). HIV-1 and hepatitis B transmission in Sudan. *AIDS* 3:725-729.
- Mohamed MK, Hussein MH, Massoud AA, Rakhaa MM, Shoeir S, Aoun AA, AboulNaser M (1996). Study of the risk factors for viral hepatitis C infection among Egyptians applying for work abroad. *J. Egypt Public Health Assoc.* 71(1-2):113-47.
- Mudawi HM, Smith HM, Fletcher IA, Fedail SS (2007a). Prevalence and common genotypes of HCV infection in Sudanese patients with hepatosplenic schistosomiasis. *J. Med. Virol.* 79:1322-1324.
- Mudawi HM, Smith HM, Rahoud SA, Fletcher IA, Saeed OK, Fedail SS (2007b). Prevalence of hepatitis B virus infection in the Gezira State of central Sudan. *Saudi. J. Gastroenterol.* 13:81-83.
- Mudawi HM, Smith HM, Rahoud SA, Fletcher IA, Babikir AM, Saeed OK, Fedail SS (2007c). Epidemiology of HCV infection in Gezira State of central Sudan. *J. Med. Virol.* 79:383-385.
- Omer RE, Van't Veer P, Kadaru AM, Kampman E, el Khidir IM, Fedail SS, Kok FJ (2001). The role of hepatitis B and hepatitis C viral infections in the incidence of hepatocellular carcinoma in Sudan. *Trans. R. Soc. Trop. Med. Hyg.* 95:487-491.
- Ranger-Rogez S, Alain S, Denis F (2002). [Hepatitis viruses: mother to child transmission]. *Pathol. Biol. (Paris)* 50:568-575.
- Shepard CW, Finelli L, Alter MJ (2005). Global epidemiology of hepatitis C virus infection. *Lancet Infect. Dis.* 5:558-567.
- Stauber R (2000). Epidemiology and transmission of hepatitis C. *Wien Med. Wochenschr.* 150:460-462.
- WHO (1999). Global surveillance and control of hepatitis C. Report of a WHO Consultation organized in collaboration with the Viral Hepatitis Prevention Board, Antwerp, Belgium. *J. Viral Hepat.* 6:35-47.
- Youssef A, Yano Y, Utsumi T, abd El-alah EM, abd El-HameedAel E, SerwahAel H, Hayashi Y (2009). Molecular epidemiological study of hepatitis viruses in Ismailia, Egypt. *Intervirolgy* 52:123-131.