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Research Article

Sero-Prevalence of Hepatitis B and Hepatitis C Viruses among Tuberculosis Patients in Kassala, Eastern Sudan

Abstract

Background: Hepatitis B (HBV) and hepatitis C (HCV) virus infection is a major concern among tuberculous (TB) patients, thus early screening of these viruses will influence the outcome of the disease.

Methods: A cross-sectional hospital based study, conducted at Kassala teaching hospital, Eastern Sudan, between June and December 2014 to investigate the sero-prevalence of HBV and HCV among TB patients. Sera samples were collected from patients and tested for HBSAg and anti-HCV bodies using immunochromatographic test (ICT) and enzyme-link immunosorbent assay (ELISA).

Results: Out of 98 TB patients recruited in the study, HBSAg and anti HCV were detected in 15.3% and 1% patients using ELISA respectively, and in 17.3% and 3.1% patients by ICT respectively, one percent patient had both HBV and HCV co-infection.

Conclusion: The sero-prevalence of HBV and HCV shown in this study call for urgent need to consider HBV and HCV screening in the national TB control program as this may reduce the risk of hepatotoxicity occurring during treatment of TB.

Introduction

Tuberculosis has remained significant global public health problem, and it has been estimated that about 8.6 million new cases and 1.3 million deaths of the world's populations occurred in 2012 [1]. Despite national and international efforts, TB remains an endemic disease in Sudan. The country has been classified among countries with high burden of TB and accounts for 15% of TB in eastern medetrenion region [2]. The prevalence of TB was estimated by 209 in 100,000 people in 2009 [3]. Hepatitis B (HBV) Virus is a major public health problem worldwide with about one third of the worlds' populations is infected with HBV and 350 millions remained asymptomatic carriers [4-6]. Worldwide chronic HBV infection is responsible for 53% of cases of hepatocellular carcinoma. In Sudan the prevalence rate of HBV was reported as 6.8% in the central Sudan [7]. Recently we have observed the prevalence of HBV as high as 8.2% among general population in Kassala eastern Sudan [8]. Hepatitis C virus is another life threatening condition, and about 350,000 deaths occur each year due to HCV infection. The global estimate showed that around 170 million chronic HCV cases, of whom 27% and 25% were reported as having liver cirrhosis and hepatocellular carcinoma respectively [9,10]. In Sudan sero-prevalence of HCV is ranging between 2.2% to 4.8% among general population to 23.7% among haemo-dialysis patients [11,12]. HBV and HCV have similar route of transmission such as blood and blood products, sharing needles and sexual activities [13]. Hepato-toxicity is a recognized sequel of anti-TB drugs namely rifampicin, pyrazinamide, and isoniazid [14]. Co infection of HBV and HCV among TB patients increased the risk of

Hepato-toxicity during anti TB treatment with the first line regimen [15]. In Sudan the prevalence of HBV and HCV infections among TB patients has not been well investigated. Thus the current study was undertaken to investigate the prevalence of HBV and HCV among TB patients in Kassala eastern Sudan, so as to provide evidence to health planners of further screening and vaccinations options.

Methods

This was a cross sectional- hospital based study conducted at Kassala teaching hospital, eastern Sudan between June and December 2014 to investigate the prevalence of HBV and HCV among TB patients. Kassala state located in Eastern Sudan nearly 600 km far from Khartoum the capital city, covers an area of 42,282 km², with populations 1.8 million inhabitants. Kassala teaching hospital is a tertiary hospital provides service for all patients referred from health centers and rural hospitals. After signing an informed consent, structured questionnaire was used to gather socio-demographic data (age, sex, education, residence, and employment from all patients infected with TB (pulmonary and extra-pulmonary) who had been admitted to the Kassala Teaching hospital. The diagnosis of TB was confirmed as per standard protocol using sputum smear for alcohol acid fast bacilli, radiological finding of pulmonary TB. Patients with concomitant HIV infection were excluded from the study. Five ml of blood were taken from each subject for detection of HBV and HCV markers, sera were centrifuged, separated and stored frozen at -18 °C. Serum samples were tested for HBSAg and anti-HCV antibodies using immune-chromatographic test (ICT), (Fortress Diagnostics Limited, Unit 2C Antrim Technology Park, United Kingdom), also sera were

checked for presence of hepatitis B surface antigen and Hepatitis C Antibodies using enzyme-link immunosorbant assay (ELISA) (Fortress Diagnostics Limited, Unit 2C Antrim Technology Park, United Kingdom). The ELISA was performed as per manufacturer's instructions. The specificity for HBV and HCV was reported as 99.92 and 99.55 respectively, while the sensitivity for HBV and HCV was accounted for 100% and 99.79% respectively. the cutoff value for positive antibody was taken as 1U/mL. Patients with IgM levels of HBSAg and anti HCV less than 1 U/mL were considered negative for both HBV and HCV respectively [16,17].

Statistical Analysis

The data was entered and analyzed using statistical Package for social sciences 16 (SPSS – 16), the mean and proportion were calculated.

Results

Patients' characteristics

A total of 98 confirmed TB patients were enrolled in this study and none of them refused to participate in the study. The vast majority have pulmonary TB (90/98,) while 8 patients have Extra-pulmonary TB (EPTB) of these 6 patients have abdominal TB and two patients have potts disease of the spine. The ages of the patients ranged from 8 to 75 years and the mean (\pm SD) age of the investigated patients was 36.03(13.3) years. Among the respondents 70(71.4%) were male, 61(6.2%) were Illiterates and 58 (59.2%) of rural residence.

Prevalence of HBV and HCV among the TB patients

Using ICT, HBSAg and anti-HCV antibodies were detected in 17 (17.3%) and 3 (3.1%) patients respectively and using ELISA technique, HBSAg and anti HCV antibodies were found in 15(15.3%) and 1 (1%) patients respectively. By rapid technique three patients were infected by both HBV and HCV, however using ELISA only one patient was detected to have both HBV and HCV infections.

Discussion

To our Knowledge this is the first report conducted in eastern Sudan to investigate the prevalence of HBV and HCV infection among TB patients, the overall prevalence of HBV and HCV in the current study was 15.3% and 1% respectively using ELISA technique. The seropositivity of HBV (15.3%) found in this study was relatively higher than the result obtained in the study conducted by Nail et

al. in Khartoum among TB patients and it is also higher than other reports carried out, in Thailand 9%, in Georgia 4.3%, in Pakistan 5.5% [18-21]. However in agreement with other study documented by Blal et al. who reported HBV positivity in 14.6% among HIV negative tuberculosis patients [20]. The prevalence of HBV among general population was reported as 6.8 %and 8.2 % in central and eastern Sudan respectively [7,8]. The proportion of HBV/TB co-infection was found to be higher in male (12.2%) than female (3.06%). This finding is similar to other reports [18,22,23]. High rate of HBV infection among male gender in this setting might be related to the gender exposure difference between males and females. Interestingly, a male preponderance was documented recently in another study conducted among general population in eastern Sudan [8]. The high frequency of HBV observed in this study may be explained by lack of adherence to universal infection control measures including vaccination. The prevalence of HCV in the present study was 1%, which is comparable with that reported by Nail et al (3.3%), and the prevalence of HCV (2.2%) among general population in Sudan [18,24]. However it is lower than previous studies done by Reis NR et al (7.5%) in Brazil, Richards et al. 22% in Georgia, Agha et al. 17% in Egypt, Khalili et al (27.45%) [25-28]. the difference between the prevalence of HBV and HCV in the current study and other results may be attributed to use of different diagnostic techniques such as PCR, ELISA, and ICT. Also the sample size may be responsible. Recently we reported the prevalence of HBV and HCV among healthy blood donors as 4, 3% and 3.1% respectively [29].

Similar to previous reports, the present study demonstrated small differences between rapid test and ELISA technique results for HCV antibodies (3%and 1% respectively) and HBSAg (17% and 15% respectively), of no doubt ELISA is more sensitive and specific as compared to the rapid test (ICT). Recently Hussain et al. have confirmed superiority of ELISA over ICT for diagnosis of HB and HC viruses [30]. Co- infection of tuberculosis, HBV and HCV increase the risk of hepatotoxicity particularly during treatment of tuberculosis, therefore it is important to identify them so as to reduce morbidity and to delay mortality. One of the limitations of this study was that the risk factors and social behaviors for HBV and HCV among TB patients were not assessed and the diagnostic tool for the identification of TB was of low sensitivity because of limited resources, also our study was a hospital-based and of small sample size. Also the ser-prevalence of HBV and HCV were not confirmed by polymerase

Table 1: Comparison in socio-demographic characteristics between the different groups of co-infected TB patients in Kassala, eastern Sudan.

Variables	Total TB patients (N=98)	HBV\TB co-infection (N=15)	HCV\TB co-infection (N=1)	HBV\HCV\TB co-infection (N=1)
Age, years	35.7 (13.9)	37.2(14.5)	25	25
Male gender	70(71.3)	11 (73.9)	0(0%)	–
Female gender	28(28.6%)	4 (26.7%)	1 (100%)	1(100%)
Rural residence	58 (59.2%)	11(73.3)	1(100%)	1(100%)
Illiteracy	61(62%)	9(60%)	1 (100%)	1(100%)
Vaccination, no	65(78.3%)	15(100%)	1(100%)	1(100%)

Data was shown as number (%) and mean (SD) as applicable.



chain reaction (PCR) so further study is needed to determine the risk factors of HBV and HCV among tuberculous patients.

Conclusion

This study documents high prevalence of HBV and HCV among TB infected patients; therefore it should be mandatory to screen every TB patient for HBV and HCV.

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Conflict of interest

The authors have no conflicts of interest. The authors are solely responsible for the content and writing of the paper.

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