Tajeldin M. Abdallah*, Mubarak I. Idriss1, Alzubair M. Ahmed1, Abdel-Aziem A. Ali2 and Osman K. Saeed2

1Faculty of Medicine, Ministry of Health, Kassala University, Sudan
2Faculty of Medicine, Gezira University, Sudan

Dates: Received: 20 March, 2015; Accepted: 08 April, 2015; Published: 10 April, 2015

*Corresponding author: Tajeldin M. Abdallah, P.O. Box 496, Department of Medicine, Faculty of Medicine, Kassala University, Kassala, Sudan, Tel: +249912820929; Fax: +249411823501; E-mail: tajeldinnm@yahoo.com

www.peertechz.com
ISSN: 2455-5363
Keywords: Hepatitis; Virus; Tuberculosis; Infection; Sudan

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 tuberculosis (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 immunochromatograph test (ICT) and enzyme-linked immunosorbantassay (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 33% 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 antiTB 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 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-chromotographic 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 1U/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 (± 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 curried 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].

**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%)                    | 1 (100%)                      |
| 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.

**Citation:** Abdallah TM, Idriss MI, Ahmed AM, Ali AA, Saeed OK (2015) Sero-Prevalence of Hepatitis B and Hepatitis C Viruses among Tuberculosis Patients in Kassala, Eastern Sudan. Glob J Infect Dis Clin Res 1(1): 001-003. DOI: 10.17352/2455-5363.000001
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.

Acknowledgement
We sincerely thank all patients who participated in this study.

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

References
1. WHO, Global TB Report 2013 Geneva; WHO/HTM/TB/2013.
2. WHO, EMRO, Stop TB Programme, Sudan. www.emro.who.int/tdr/programmes/stop-tb-sudan.html.
3. World Health Organization (2010) Global tuberculosis control: WHO Report 2010 Geneva.
4. Al-Jabir AA, Al-Adawi S, Al-Abri JH, Al-Dhayr SH (2004) Awareness of hepatitis B virus among undergraduate medical and non-medical students. Saudi Med J 25: 484-7.
5. Lavanchy D (2004) Hepatitis B virus epidemiology, disease burden, treatment and current and emerging prevention and control measures. J Viral Hepat 11: 97-1107.
6. Anjum CH, Siddiqui Y, Ahmed SR, Usman YR (2005) Knowledge of Students regarding Hepatitis and HIV/AIDS of a Private Medical University in Karachi. J Pak Med Assoc 55: 285-288.
7. Mudawi HM, Smith HM, Rahoud SA, Fletcher IA, Saeed OK, et al. (2007) Prevalence of hepatitis B virus infection in the Gezira state of central Sudan. Saudi J Gastroenterol 13: 81-83.
8. Abdallah TM, Mohammed MH, ALI AA (2011) Seroprevalence and epidemiological factors of hepatitis B virus (HBV) infection in Eastern Sudan. International Journal of Medicine and Medical Sciences 3: 239-241.
9. World Health Organization (WHO) Hepatitis C. June 2011. Retrieved 2011-07-13.
10. Hajarizadeh B, Grebely J, Dore G (2013) Epidemiology and natural history of HCV infection. Rev Gastroenterol Hepatol 10: 553-662.
11. Mudawi HM, Smith HM, Rahoud SA, Fletcher IA, Babikir AM, et al. (2007) Epidemiology of HCV infection in Gezira state of central Sudan. J Med Virol 79:383-385.
12. El-Amin HH, Osman EM, Mekki MO, Abdelraheem MB, Ismail MO et al. (2007) Hepatitis C virus infection in hemodialysis patients in Sudan: two centers' report. Saud J Kidney Dis Transpl 18: 101-106.
13. Liu Z, Hou J (2006) Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) Dual Infection. Int J Med Sci 3: 57-62.
14. Shu CC, Lee CH, Lee MC, Wang JY, Yu CJ, et al. (2013) Hepatotoxicity due to first-line anti-tuberculosis drugs: a five-year experience in a Taiwan medical centre. Int J Tuberc Lung Dis 17: 934-9.
15. Wan JY, Liu CH, Hu FC, Chang HC, Liu JL, et al. (2011) Risk factors during anti-tuberculosis treatment and implications of hepatitis virus load. J Infect 62: 448-55.
16. Fortress Diagnostics Limited. Unit 2C Antrim Technology Park, Antrim, BT41 1QS (United Kingdom). HBsAg ELISA (CE 1293) | Revision No. 2 MAY/14 V. 2012-02, available at www.fortressdiagnostics.com.
17. Fortress Diagnostics Limited. Unit 2C Antrim Technology Park, Antrim, BT41 1QS (United Kingdom). Anti-HCV ELISA (CE 1293) | Revision No. 2 MAY/14 V. 2013-01, available at www.fortressdiagnostics.com.
18. Nail AM, Ahmed NE, Gaddour MOE (2013) Seroprevalence of hepatitis B and C viruses among tuberculosis patients. Sudan Journal of Medical science 8: 17-22.
19. Sirinak C, Kittikraisak W, Pinjeesekikul D, Charusuntasri P, Luanloed P, et al. (2008) Viral hepatitis and HIV – associated tuberculosis: Risk factors and TB treatment outcomes in Thailand. BMC Public Health 8: 245.
20. Kuniholm MH, Mark J, Aladashvili M, Shubladze N, Khechinashvili G, et al. (2008) Risk factors and algorithms to identify hepatitis C, hepatitis B, and HIV among Georgian tuberculosis patients. International Journal of Infectious Diseases 12: 51-6.
21. Akhtar I, Qamar MU, Hakeem A, Waheed A, Sarwar F, et al. (2013) Seroprevalence of HBV and HCV at tuberculosis patients at Sheikh Zayed Hospital Rahim Yar Khan, Pakistan. Biomedica 29: 69-72.
22. Bial CA, Passos SR, Horn C, Georg J, Bonecini-Almeida MG, et al. (2005) High prevalence of hepatitis B virus infection among tuberculosis patients with and without HIV in Rio de Janeiro, Brazil. Eur J Clin Microbiol Infect Dis 24: 41-3.
23. Aires RS, Matos MA, Lopes CL, Teles SA, Kozlowski AG, et al. (2012) Prevalence of Hepatitis B virus infection among tuberculosis patients with or without HIV in Goiânia City, Brazil. J Clin Virol 54: 327-321.
24. Mudawi HMY (2008) Epidemiology of viral hepatitis in Sudan. Clin Exp Gastroenterol 1: 9-13.
25. Reis NR, Lopes CL, Teles SA, Matos MA, Carneiro MA, et al. (2011) Hepatitis C virus infection in patients with tuberculosis in Central Brazil. Int J Tuberc Lung Dis 15: 1397-402.
26. Richards D, Mikiashvili T, Parris JJ, Kourbatova EV, Wilson JCE, et al. (2006) High prevalence of hepatitis C virus but not HIV co-infection among patients with tuberculosis in Georgia. Int J Tuberc Lung Dis 10: 396-412.
27. Agha MA, EL-Mahalawy II, Seleem HM, Helwa MA (2015) Prevalence of hepatitis C virus in patients with tuberculosis and its impact in the incidence of anti-tuberculosis drugs induced hepatotoxicity. Egyptian Journal of Chest Diseases and Tuberculosis 64: 91-96.
28. Khalili H, Khavidaki S, Mehrnaz R, Rezaie L, Emrinami M (2009) Antituberculosis drugs related hepatotoxicity; incidence, risk factors, pattern of changes in liver enzymes and outcome. J Pharm Sci 17: 163-167.
29. Abdallah TM, Ali AA (2012) Sero-prevalence of transfusion-transmissible infectious diseases among blood donors in Kassala, eastern Sudan. Journal of Medicine and Medical Science 3: 260-262.
30. Hussain N, Aslam M, Farooq R (2011) Sensitivity Comparison between Rapid Immuno-Chromatographic Device Test and ELISA in Detection and Sero-Prevalence of HBsAg and Anti-HCV antibodies in Apparently Healthy Blood Donors of Lahore, Pakistan. World Academy of Science, Engineering and Technology 60: 1112-4.