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Co-infection of hepatitis B and C among HIV patients: A study in Jammu, India

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ABSTRACT

Background: A Co-infection of hepatitis B virus (HBV) and/or hepatitis C virus (HCV) in human immunodeficiency virus (HIV) infected patients increases hepatic complications. The current study was performed to examine the frequency of HBV/HCV co-infection in HIV-infected patients in a tertiary care hospital of Jammu state of North India.

Methods: A total of 386 cases with HIV infection and 386 non-HIV subjects were included in the study. The samples were diagnosed for the presence of HBV and HCV on the basis of presence of hepatitis B surface antigen (HBsAg) and anti-HCV IgG respectively with rapid immunochromatographic card method and later confirmed with ELISA.

Results: We found that 10 (2.59%) patients were co-infected with HBV and/or HCV in the HIV-positive patients. HBsAg was detected in 9 (2.33%) patients, out of which 7 (1.81%) were males and 2 (0.52%) were females. Two (0.52%) patients were diagnosed with HCV [1 (0.26%) male and 1 (0.26%) female]. A Triple combined infection with HBV+HCV+HIV was seen in only 1 (0.26%) patient. In non-HIV subjects, HBsAg was found in 9 (2.33%) patients and no patient was infected with HCV.

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Conclusion: Our study demonstrates a 2.33% and 0.52% prevalence of HBV and HCV respectively among HIV-positive patients. Males are more at risk of acquiring HBV than females. A regular diagnosis of HBV/HCV is required for the early detection of the infection for an effective treatment.

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Introduction

Hepatitis B virus (HBV) & Hepatitis C virus (HCV) co-infections are commonly seen in human immunodeficiency virus (HIV)-infected patients. HIV weakens the immune system; therefore, other infections are more likely to advance in a person infected with this virus. Co-infections can become more serious in HIV-infected people than in non-infected people. HIV, HBV & HCV are major health concerns. As these viruses share the same transmission routes, so the HIV-positive patients are more prevalent towards HBV and HCV co-infection.

HIV, HBV and HCV are among the most frequent chronic viral pathogens of public health concerns globally with similar transmission route *viz.* sexual transmission, blood-contact, and intravenous drug injection [1-3]. In the last few decades, these viruses have emerged as a major cause of fatality due to hepatic disorders globally [4,5]. It has been estimated that 1/3 of deaths of HIV patients are related (direct or indirect) to hepatic ailments. Liver diseases in HIV-patients can occur due to co-infection with HBV/HCV, hepatic tuberculosis, chronic consumption of alcohol or the consequences of anti-retroviral therapy (ART) [6,7]. According to UNAIDS, 37.9 million people were infected with HIV in 2018 [8]. Further, HBV and HCV infections comprise 400 million and 170 million cases respectively in the world [9]. Worldwide, there are approximately 2.28 million cases of HIV–HCV co-infections [10]. Among the ~37 million HIV infected patients, the prevalence of HCV coinfection is 5-20% [11].

The existence of one virus alters the course of infection and pathogenesis of another virus during coinfection. HBV and HCV co-infections are more frequent among HIV-infected individuals because of similar transmission pathways. HIV facilitates HBV coinfection and accelerates the progression of liver pathology to cirrhosis, fibrosis. hepatocellular carcinoma, and end-stage liver disease up to 3 times more rapid as compared to non-HIV patients [12-14]. According to WHO global hepatitis report

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(2017), The frequency of HIV-HCV co-infection among intravenous drug users (IDU's) has been estimated to be more than half of the total cases of coinfection [15].

HBV co-infection in HIV patients increases its morbidity and mortality in comparison to single infection of HIV or HBV [16]. Co-infections of HIV with HBV or HCV leads to decreased survival rate, progression of hepatic disorder and enhanced risk of hepatotoxicity linked with ART [17]. It has been reported that HIV can negatively affect the natural history, physiology, diagnosis and therapeutic responses to HBV [18]. As a result of liver related diseases, patients co-infected with HIV and HBV have a high mortality rate, up to 19-fold higher than those infected with HBV alone, and a 6-fold chance to develop chronic hepatitis as compared to non-HIV patients [19]. HIV further complicates diagnosis of HBV by disappearance of anti-HBs and reappearance of HBsAg (reverse seroconversion). If liver disease emerges in the presence of anti-HBs in HIV-infected individuals, it is recommended that tests for HBV serological markers and HBV DNA be repeated [16]. In addition, HIV decreases the rate of HBeAg clearance and enhances HBV DNA replication [16, 20]. HCV-HBV co-infection among HIV infected patients is also a frequent complication in India. Therefore, all HIV patients should be diagnosed for the presence of markers of HBV/HCV infection in blood [21]. The co-infection of HBV/HCV in HIV-positive persons has not been studied yet in Jammu region of India. Therefore, this study was designed to analyse the co-infection among HIV patients in this area.

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MATERIAL AND METHODS

Study design

This was a retrospective study carried out in a tertiary care hospital in Jammu, India. It was a one-year study (April 2015 - March 2016) to detect the co-infection of HBV/HCV in HIV positive patients attending the Integrated Counselling and Training Centre (ICTC) department of the hospital.

Inclusion and exclusion criteria

HIV infected positive patients were taken for the analysis. Patients having HBV or HCV infection, from non-HIV-patients were excluded from the study.

Samples

Antiretroviral therapy (ART) referred blood samples (5 ml) were collected by venepuncture in a collection tube without anticoagulant for the analysis of HBV and/or HCV co-infection in the HIV infected individuals. The blood was left to settle for 30 minutes for blood coagulation and then centrifuged at 2500 rpm for 10 minutes at 4 °C to get serum as supernatant. The sera were diagnosed for HBsAg and HCV by immunochromatography method. The positive samples for were further confirmed for HBsAg and HCV by ELISA.

Detection of HCV and HBV in serum by rapid diagnostic test

HBV and HCV in serum sample were diagnosed with the help of SD BIOLINE HBsAg one step test and SD BIOLINE HCV one step test respectively according to manufacturer's protocol.

SD BIOLINE HBsAg one step test is a rapid and sensitive method to detect the hepatitis B surface Antigen (HBsAg) in human serum. However, SD BIOLINE HCV one step test is a similar immunoassay for the qualitative detection of anti-HCV antibodies in human serum.

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ELISA for confirmation of HBV/HCV

ErbaLisa SEN HBsAg (Transasia Bio-medicals Ltd.) and ErbaLisa Hepatitis C (Transasia Bio-medicals Ltd.) were used for the prognosis of HBV and HCV respectively in the serum sample. The assays were performed according to manufacturer's protocol.

The ErbaLisa SEN HBsAg is based upon the use of a solid phase prepared with polyclonal anti-HBsAg. Detection is carried out using monoclonal anti-HBsAg. This system of using poly-mono blend of antibodies aims at achieving high assay sensitivity and specificity respectively.

The Erba Lisa Hepatitis C is based on indirect ELISA using a solid phase prepared with the mixture of synthetic peptides and recombinant proteins of HCV i.e. CORE, NS3, NS4 and NS5. Detection is carried out using anti-human IgG antibodies conjugated with horseradish peroxidase (HRPO).

RESULTS

A total of 386 HIV-infected patients (242 males, 144 females), and 386 non-HIV subjects were included in the study. Out of these, 10 (2.59%) individuals were found to be co-infected with HBV and/or HCV among HIV-positive patients. HBsAg was detected in 9 (2.33%) patients [7 (1.81%) males and 2 (0.51%) females]. HCV-antibodies were detected 2 patients (0.51%) [1 (0.25%) male and 1(0.25%) female]. One (0.25%) patient had a triple infection *i.e.* HIV, HCV and HBV. Among HIV-negative patients, 9 (2.33%) patients were infected with HBV of which 7 were males and 2 females. None was detected with HCV infection among HIV-negative patients. Table 1 represents the cases of HBV/HCV coinfection among HIV positive patients. Figure 1 illustrates the distribution

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of co-infection among males and females. Age wise, both HBV and HCV were more prevalent in the age group 20-30 years (Table 2).

Table 1: Distribution of HBV and HCV co-infection among HIV positive patients.

	HBsAg Negative	**HBsAg Positive**	**Total**	**HBV prevalence**
HCV negative	376	8	384	2.08%
HCV positive	1	1	2	50%
Total	377	9	386	2.33%
HCV prevalence	0.26%	11.11%	0.52%	

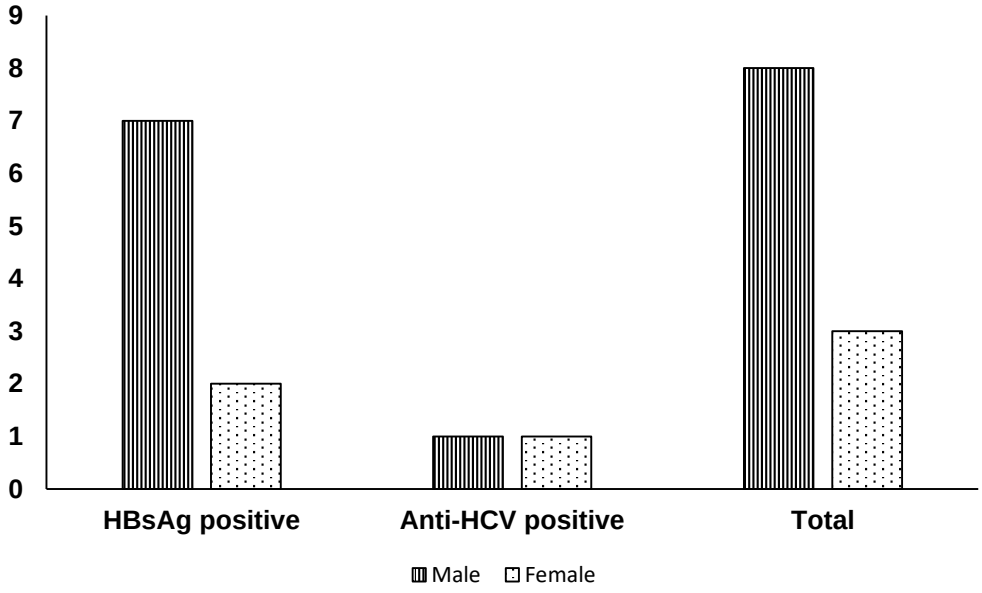

Figure 1: Gender wise seroprevalence of HCV/HBV coinfection in HIV-positive patients

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Table 2: HBV and HCV prevalence among different age groups of HIV patients.

Age group in years	HBV+HIV	HCV+HIV	HBV+HCV+HIV
0-10 yrs.	0	0	0
10-20yrs.	0	0	0
20-30yrs.	4	1	1
30-40yrs.	3	0	0
40-50yrs.	0	0	0
50-60yrs.	1	0	0
60-70yrs.	0	0	0

DISCUSSION

According to WHO, hepatitis caused by HBV and HCV was responsible for 1.34 million deaths worldwide in 2015, however, HIV accounted for 1.1 million deaths in the same year [22]. The likelihood of mortality among people co-infected with HIV-HBV and HIV-HCV are 1.6 and 1.4 higher than HIV-mono-infected patients [23]. In India, the prevalence of HIV was estimated to be 0.22% (2.14 million) in 2017 that makes it third largest population of the world infected with HIV [24].

HBV prevalence varies according to geographical area and it is classified into endemic areas with high, intermediate and low incidence [25]. India is considered among areas with intermediate

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endemicity of HBV, with a 2-7% seroprevalence of HBV [25]. The overall prevalence of HCV in India is low (1%). In Jammu, the incidences of HCV have been recorded to be 1.158% [26]. Only few reports are available on the seroprevalence of HBV/HCV co-infection in HIV patients in India. The co-infection observed in various studies are highly variable. It has been recorded to be 30.4% [27] 2.25% [28] 7.7% [1] and 3.5% [29] in different regions of India.

In the present study, 386 HIV-infected patients (242 males, 144 females) were examined for the prevalence of HBV and HCV co-infection. We found that a 2.33% seroprevalence of HBV among HIV patients. HCV co-infection was present in only 0.51% HIV-positive patients. HBV+HCV+HIV infection was seen in only 1 (0.25%) patient. The route of transmission in the patients who were found to be co-infected with HBV and/or HCV in HIV-positive patients was sexual contact. The most affected age was 20-30 years for both HCV and HBV. This may be due to the high sexual activity. HBV infection was more present in males; however, HCV was detected equally among both genders. The reason for low prevalence of HBV in females might be the hepato-protective effect of estrogen. Estradiol and estrogen receptors are known to protect liver from oxidative stress and inflammation mediated damage [30, 31, 32]. This results in retarded development of liver fibrosis, cirrhosis and end-stage liver disease in females. Further, it has been found that androgen receptors provide favourable condition for HBV progression in mice [33].

In conclusion, it can be said that HIV infected patients can easily acquire HBV/HCV infection due to immunodeficiency caused by HIV, which is now a common problem in AIDS (acquired immunodeficiency syndrome) patients in India. Further, males are more at risk of acquiring HBV infection. Also, the present study gives evidence of AIDS patients having a higher chance of acquiring simultaneous infection of HBV/HCV via common course of transmissions in the Jammu region of India. Therefore, all AIDS patients should be regularly diagnosed for the presence of serum markers of HBV.HCV.

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REFERENCES

1. S. Sarvanan, V. Velu, N. Kumarasamy, S. Nandakumar, K.G. Murugavel, P. Balakrishnan, S. Suniti, and S.P. Thyagarajan, "Co-infection of hepatitis B and hepatitis C virus in HIV-infection patients in South India," World Gastroenterol., vol. 13, pp. 5015-5020, 2007.
2. M. Koziel, "Viral hepatitis in HIV infection," New Engl. J. Med., vol. 356, pp. 1445-1454, 2007.
3. M. Puoti, M. Airoldi, R. Bruno, B. Zanini, A. Spinetti, C. Pezzoli, A. Patroni, F. Castelli, P. Sacchi, G. Filice and G. Carosi, "Hepatitis B virus Co-infection in Human immunodeficiency Virus-infected subjects," AIDS Rev., vol. 4, pp. 27-35, 2002.
4. J.K. Rockstroh, "Influence of viral hepatitis on HIV infection," J. Hepatol., vol. 44, pp. 525-7, 2006.
5. J.R.G. Dumping and M. Nelson, "HIV and hepatitis with co-infection," Int. J. Clin. Pract, vol. 59, pp. 1082 -92, 2005.
6. N. Kamarasamy, S. Vallabhaneni, T.P. Flannigan, K.H. Mayer and S. Solomon, "Clinical profile of HIV in India," Indian J. Med. Res., vol. 121, pp. 377-394, 2005.
7. P.M. Rathi, D.N. Amarapurkar, N.E. Borges, G.V. Koppikar and R.H. Karlo, "Spectrum of liver diseases in HIV infection," Indian J. Gastroenterol., vol. 16, pp. 94-95, 1997.
8. Joint United Nations Programme on HIV/AIDS (UNAIDS), "Global HIV & AIDS statistics — 2019 fact sheet," Availble at <https://www.unaids.org/en/resources/fact-sheet> accessed on 27th November 2019.
9. D. Konstantinou and M. Deutsch, "The Spectrum of HBV/HCV Coinfection: Epidemiology, Clinical Characteristics, Viral Interactions and Management," Ann. Gastroenterol., vol. 28(2), pp. 221-228, 2015.

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10. L. Platt, P. Easterbrook, E. Gower, B. McDonald, K. Sabin K, C. McGowan, I. Yanny, H. Razavi and P. Vickerman, "Prevalence and burden of HCV co-infection in people living with HIV: a global systematic review and meta-analysis," Lancet Infect. Dis., vol. 16(7), pp.797-808, Jul 2016.

11. K.P. Singh, M. Crane, J. Audsley, A. Avihingsanon, J. Sasadeusz and S.R. Lewin, "HIV-hepatitis B virus coinfection: epidemiology, pathogenesis, and treatment," AIDS, vol. 31(15), pp. 2035-2052, 2017.

12. A. Mocroft, A. Monforte, O. Kirk, M.A. Johnson, N. Friis-Moller, D. Banhegyi, et al, "Decline in AIDS and death rates in EuroSIDA study: An observational study," Lancet, vol. 362, pp. 22-9, 2003.

13. B. Soto, A.S. Quijano, L. Rodrigo, J.A. del Olmo, M. Garcia-Bengoechea and J. Herandez-Quero, "Human immunodeficiency virus infection modifies the natural history of chronic parentally acquired hepatitis C virus with an unusually rapid progression to cirrhosis," J. Hepatol., vol. 26, pp. 1-5, 1997.

14. A. Vallet-Pichard and S. Pol., "Natural history and predictors of severity of chronic hepatitis C virus (HCV) and human immunodeficiency virus (HIV) co-infection," J. Hepatol., vol. 44, pp. 528-34, 2006.

15. World Health Organization, "Global Hepatitis Report, 2017. 2017: Geneva," Available at <http://www.who.int/hepatitis/publications/global-hepatitis-report2017/en/> Accessed Nov. 27, 2019.

16. C. L. Thio, Hepatitis B and human immunodeficiency virus co-infection," Hepatology, vol. 49, pp. 138-145, 2009.

17. S. Gupta and S. Singh, Hepatitis B and C virus co-infections in human immunodeficiency virus positive North Indian Patients World J. Gastroenerol 2006 November 14; 12(42): 6879-6883.

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18. M.J. Alter, "Epidemiology of viral Hepatitis and HIV confection," J. Hepatol., vol. 44, pp. S6-S9, 2006.

19. N. Bodsworth, B. Donovan and B.N. Nightangle, "The effect of concurrent Human immunedeficiency virus (HIV) infection on chronic hepatitis B; a study of 150 homosexual men," J. Infect. Dis., vol. 160 (4), pp. 57782, 1989.

20. J.F. Colin, D. Cazels –Hatem, D, M.A. Loriot, M. Martinot-Peignouu, B.N. Pham, A. Auperin, C. Degott, J.P. Benhhamou, S. Erlinger, D. Valla and P. Marcellin, "Influence of human immunodeificiency virus infection on chronic hepatitis B in homosexual men," Hepatology, vol. 29, pp. 1306, 1999.

21. N. Chandra, N. Joshi, Y.S.N. Raju and A. Kumar, 'Hepatitis B and/or C co-infection in HIV infected patients: A study in a tertiary care centre from South India," Ind. J. Med. Res., vol. 138(6), pp. 950-954, 2013.

22. World Health Organization, "Viral hepatitis: a hidden killer gains visibility," Available at <https://www.who.int/publications/10-year-review/chapter-hepatitis.pdf?ua=1> accessed on 27th Nov 2019.

23. A.C. Thornton, S. Jose, S. Bhagani, D. Chadwick, D. Dunn, R. Gilson, J. Main, M. Nelson, A. Rodger, C. Taylor, E. Youssef, C. Leen, M. Gompels, S. Kegg, A. Schwenk and C. Sabin C; UK Collaborative HIV cohort (UK CHIC) steering committee, "Hepatitis B, hepatitis C, and mortality among HIV-positive individuals," AIDS, vol. 31(18), pp. 2525-2532, 2017.

24. National AIDS Control Organization, "India HIV Estimations 2017: Fact Sheets," Available at <http://naco.gov.in/sites/default/files/Fact%20Sheets_1.pdf> Accessed on 27th Nov 2019.

25. G. Ray, "Current Scenario of Hepatitis B and Its Treatment in India," J. Clin. Trans. Hepatol., vol. 5(3), pp. 277-296, 2017.

ISSN: 0971-1260

Vol-22-Issue-17-September-2019

26. S.S. Sharma, K. Razdan, A. Kumar, S.A. Naik and G. Kaur, "Wrath of Hepatitis C in Jammu: A Hospital Based Population Study," J. Med. Sci. Clin. Res., vol. 6(7), pp. 647-656, 2018.

27. S.S. Tankhiwale, R.K. Khadse, and S.V. Jalgonkar, "Seroprevalance of anti HCV and hepatitis B surface antigen in HIV infected patients," Indian J. Med. Microbiol., vol. 21, pp. 268-70, 2003.

28. A.K. Tripathi, M. Khanna, N. Gupta and M. Chandra, "Low prevalence of hepatitis B virus and hepatitis C virus co infection in patients with human immunodeficiency virus in Northern India," J. Assoc. Physicians India, vol. 55, pp. 429-31, 2007.

29. S.M. Ahsan and P.R. Mehta, "HIV, HBV and HCV co-infection study'" Bombay Hospital J., vol. 3, pp. 5-7, 2002.

30. R. Baden, J.K. Rockstroh and M. Buti, "Natural History and Management of Hepatitis C: Does Sex Play a Role?" J. Infect. Dis., vol. 209(3), pp. S81-5, 2014.

31. S. Baig, "Gender Disparity in Infections of Hepatitis B Virus," J. Coll. Physicians Surg. Pak., vol. 19(9), pp. 598-600, 2009.

32. W.C. Liu and Q.Y. Liu, "Molecular mechanisms of gender disparity in hepatitis B virus-associated hepatocellular carcinoma," World J. Gastroenterol., vol. 20(20), pp. 6252-6261, 2014.

33. S.H. Wang, P.J. Chen and S.H. Yeh, "Gender disparity in chronic hepatitis B: Mechanisms of sex hormones," J. Gastroenterol. Hepatol., vol. 30(8), pp. 1237-45, 2015.