International Journal of Research in Medical Sciences
Singh L et al. Int J Res Med Sci. 2020 Sep;8(9):3252-3255
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20203672

Original Research Article

Hepatitis B virus and hepatitis C virus co-infection among outdoor patients and indoor patients of tertiary care institute, Bathinda, Punjab, India

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Received: 29 June 2020
Accepted: 10 August 2020

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ABSTRACT

Background: Hepatitis virus infections have many serious consequences like chronic hepatitis, fulminant hepatitis, liver cirrhosis, hepatocellular carcinoma and liver cancer. Serological test is thus necessary to identify hepatitis virus in the body. An observational study was conducted with an objective to detect hepatitis B surface antigen (HBsAg) and anti-hepatitis C virus (HCV) antibodies by rapid card tests and to find the prevalence of co-infection with hepatitis B and hepatitis C viruses from January 2019 to June 2019.
Methods: Blood samples were received from patients irrespective of age and sex, constituted the material for the present study. All samples were tested on hepacard and tri-dot card for the detection of hepatitis B virus and hepatitis C virus and results were interpreted as per Clinical Laboratory Standards Institute guidelines.
Results: Out of 3488 samples, 254 samples were positive for hepatitis virus infection. Out of these 254 samples positive for hepatitis viruses, 22 (0.6%) patients were positive for hepatitis B virus and 232 (6.6%) patients were positive for hepatitis C virus. Only 2 (0.7%) of these patients showed co-infection with both viruses.
Conclusions: Male patients showed more positivity of hepatitis virus as compared to females. Patients were more from outpatient department (OPD) as compared to inpatient department (IPD). Hepatitis virus infection was found to be highest in the age group 21-40 and lowest in the age group above 80 years. Both the co-infected patients were males and from IPD.

Keywords: Anti-hepatitis C virus antibodies, Hepatitis B surface antigen, Hepatitis virus infection, Hepacard, Tri-dot

INTRODUCTION

Hepatitis viruses are a heterogeneous group of viruses that are taxonomically diverse but all are hepatotropic and cause acute inflammation of the liver.[1] There are six types of hepatitis viruses i.e. hepatitis A, B, C, D, E, and G. Type F is provided to be a mutant of type B virus and not a separate entity so type F was deleted as a separate hepatitis virus.[2] Infected patients are at higher risk of developing liver-related incidents, which include liver failure, liver cirrhosis and hepatocellular carcinoma.[3] Acute hepatitis sometimes progresses to chronic hepatitis and it rarely leads to acute liver failure.[4] Acute liver failure is a rare but life threatening critical illness that occurs most often in patients who do not have preexisting liver disease.[5] Acute liver failure is an uncommon disorder that leads to jaundice, coagulopathy and multisystem organ failure.[6] Hepatitis B and hepatitis C virus transmit through perinatal, parenteral and sexual route.[1] Hepatitis B virus (HBV) is the most widespread and the most important type

among hepatitis viruses. Through it commonly produces acute self-limiting hepatitis, which may be subclinical or symptomatic; it is also capable of causing a range of hepatitis complications including chronic hepatitis, fulminant hepatitis, liver cirrhosis and liver cancer. Hepatitis B virus is the only DNA virus among hepatitis viruses. It belongs to the family *Hepadnaviridae*, under the genus *Orthohepadnavirus*. Hepatitis B virus infects more than 300 million people worldwide and is a common cause of liver disease and liver cancer.[7] Hepatitis B virus is a complex 42 nm double-shelled particle. The envelope of the virus contains hepatitis B surface antigen (HBsAg). It encloses an inner icosahedral 27 nm nucleocapsid i.e. core, which contains hepatitis B core antigen (HBcAg). The viral deoxyribonucleic acid (DNA) is a closed, circular, partially double-stranded molecule of 3.2 kilobase (rcDNA).[8] Under the electron microscope, sera from type B hepatitis patients show three types of particles: the most abundant form is a spherical particle, 22 nm in diameter; the second type of a particle is filamentous or tubular with a diameter of 22 nm and of varying length (~200 nm); and the third type of particle, far fewer in number, is a double-walled spherical structure, 42 nm in diameter. This particle is the complete hepatitis B virus. It was first described by Dane in 1970 and so is known as the Dane particle. The outer surface envelope is made up of HBsAg and inner 27 nm size nucleocapsid consist of core antigen (HBcAg) and precore antigen (HBeAg) and partially double-stranded DNA.[9]

Hepatitis C virus is a 50-60 nm virus with a linear and single-stranded RNA genome.[9] There are about 175 million hepatitis C virus infected patients worldwide that constitute 3% of the world's population. Hepatitis C virus is a hepatotropic ribonucleic acid (RNA) virus that causes progressive liver damage.[10] It consists of three structural proteins-the nucleocapsid core protein C and two envelope glycoproteins (E1 and E2) and seven non-structural proteins- NS1, NS2, NS3, NS4A, NS4B, NS5A and NS5B.[11] It belongs to the family *Flaviviridae* and genus hepacivirus.[12] Hepatitis C virus (HCV) infection is an important cause of cirrhosis and hepatocellular carcinoma worldwide.[13] Viruses of the *Flaviviridae* family possess a positive-strand RNA genome that in the case of HCV is 9.6 kb long and encodes for a single polyprotein of ~3,000 amino acids.[14] Hepatitis B and hepatitis C virus infections represent significant public health issue worldwide.[15]

Hepatitis B virus and hepatitis C virus are distinct viruses with completely different life cycles.[16] Hepatitis B virus (HBV) and hepatitis C virus (HCV) have several important similarities including worldwide distribution, hepato-tropism, similar modes of transmission and the ability to induce chronic infection that may lead to liver cirrhosis and hepatocellular carcinoma.[17]

Acute HBV/HCV co-infection is more prevalent in patients who inject drugs.[18] Co-infected patients represent a diverse group with various patterns of viral replication and great variations of immune profile.[19] Patients with dual hepatitis B virus and hepatitis C virus infection have more severe liver disease and are at an increased risk for progression to hepatocellular carcinoma.[20] Interactions between hepatitis B virus and hepatitis C virus have been difficult to study because of the lack of appropriate model systems.[21] Dual infection with hepatitis B virus and hepatitis C virus in the same host ranges from 1 to 15%.[22]

METHODS

The present study was undertaken to detect the prevalence of hepatitis B virus, hepatitis C virus and their co-infection in our tertiary care hospital. This study was an observational study conducted in the Department of Microbiology, Adesh Institute of Medical Sciences and Research (AIMSR), over a period of six months from January 2019 to June 2019 after the approval from AIMSR research committee and ethics committee, Adesh University with following objectives: to detect hepatitis B surface antigen (HBsAg) by rapid card test, to detect anti-HCV antibodies by rapid card test and to find the prevalence of co-infection with hepatitis B and hepatitis C viruses.

Blood samples were received from patients irrespective of age and sex, constituted the material for the present study during the period of six months. The specimen included whole blood. All samples were tested on Hepacard and Tri-dot card for the detection of hepatitis B virus and hepatitis C virus respectively and results were interpreted as per Clinical Laboratory Standards Institute guidelines.

RESULTS

Out of 3488 patient's samples, 1674 (48%) patients were from OPD and 1814 (52%) were from IPD. 1736 (49.8%) were male patients and 1752 (50.2%) were female patients.

Table 1: Department wise distribution of hepatitis viruses in patients.

Name of department	No. of patients	Percentage
Surgery	76	30
Orthopaedic	34	13.4
Medicine	29	11.4
Psychiatry	23	9
Ophthalmology	23	9
OBG	20	7.9
ENT	20	7.9
CCU	7	2.7
Chest	7	2.7
Urology	3	1.9
Other	12	4.7
Total	254	100

Out of these 3488 patients, 254 (7.3%) patients were positive for hepatitis virus infections. Among these, the highest number of patients were from surgery (76) and

lowest were from urology (3) department. 34 patients were from orthopedics, 29 from medicine, 23 each from ophthalmology and psychiatry, 20 each from obstetrics and gynecology (OBG) and ear, nose, and throat (ENT), 7 each from cardiac intensive care unit (CCU) and chest, and 12 from other departments (Table 1).

From 254 hepatitis virus positive patients, infections were highest (82 patients) in age group 21-40 and lowest (3 patients) in age group above 80 years. 81 patients were in the age group 61-70 years, 76 in the age group 41-60 years and 12 patients were in the age group 0-20 years (Table 2).

Out of 254 hepatitis virus positive patients, 22 (0.6%) patients were positive for hepatitis B virus. 232 patients were positive for hepatitis C virus. 2 (0.7%) patients were positive for both hepatitis B and hepatitis C viruses (Figure 1). Overall prevalence of hepatitis B was 0.6% and hepatitis C was 6.6%.

Table 2: Age wise distribution of hepatitis viruses in patients.

Age (in years)	No. of patients	Percentage
0-20	12	4.7
21-40	82	32.3
41-60	76	30
61-80	81	31.9
>80	3	1.1
Total	254	100

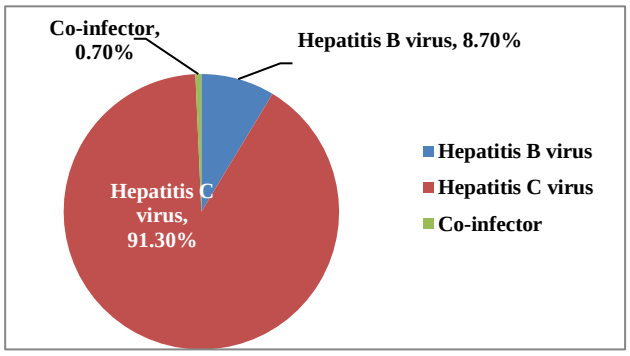

Figure 1: Patient's samples positive for hepatitis B and hepatitis C virus infections.

Out of these 254 hepatitis positive patients, 130 (51.2%) patients were from OPD and 124 (48.8%) were from IPD. 153 (60.2%) were male patients and 101 (39.8%) were female patients. Out of 22 hepatitis B virus infected patients, 14 (63.6%) were males and 8 (36.4%) were females. 9 (41%) patients were from IPD and 13 (59%) from OPD.

Out of 232 hepatitis C virus infected patients, 141 (60.8%) were males and 91 (39.2%) were females. 117 (50.5%) patients were from IPD and 115 (49.5%) were from OPD. Both of the co-infected patients were males and were from IPD.

DISCUSSION

A total of 3488 samples received from patients irrespective of age and sex, constituted the material for the present study during the period of six months. 254 patients were positive for hepatitis virus infection.

In the present study, prevalence of hepatitis B virus was 0.6% (22 cases), which is comparable with the study of Malhotra et al (1.5%) and Hassuna et al (0.9%).[15,19]

Prevalence of hepatitis C virus was 6.6% (232), which is comparable with the study of Hassuna et al (6%), Baseke et al (5.6%) and Lin et al (5.7%).[19-21]

Prevalence of co-infection of both hepatitis B and hepatitis C viruses were 0.7% (2 cases) which is comparable with study of Malhotra et al (0.8%) and Lin et al (0.7%).[15,21]

Out of 254 patients, 153 (60.2%) were male patients and 101 (39.8%) were female patients. Prevalence of hepatitis B virus among males (63.6%) and females (36.4%), comparable with the study of Junejo et al (67.5%) for males and (32.5%) for females and Agarwal et al (67.4%) for males and (32.6%) for females.[22,23] Prevalence of hepatitis C virus in present study among males (60.8%) and females (39.2%), comparable with the study of Omote et al (61%) for males and (39%) for females.[24]

In present study, from 254 positive patients, hepatitis virus infection was highest in age group 21-40 and lowest in age group above 80 years, which is comparable to study of Khan et al and Omote et al.[24]

CONCLUSION

Male patients showed more positivity of hepatitis virus as compared to females. Patients were more from OPD as compared to IPD. Patients were more from surgery department and less from urology and other departments. Hepatitis virus infection was highest in the age group 21-40 and lowest in the age group above 80 years. Hepatitis B was more in males as compared to females and more in OPD as compared to IPD. Hepatitis C infection was seen more in males as compared to females and more in IPD as compared to OPD patients. Out of co-infected patients, both were males and both from IPD (one from surgery and one from the psychology department).

ACKNOWLEDGEMENTS

Authors would like to thank the Department of Microbiology, AIMSR, Bathinda, for providing with all the facility and support for completing this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Singh L, Mittal S, Kaur A, Singh S, Tiwary RK, Singh H. Hepatitis B virus and hepatitis C virus co-infection among outdoor patients and indoor patients of tertiary care institute, Bathinda, Punjab, India. Int J Res Med Sci 2020;8:3252-5.