Original Article

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Hepatitis B- and Hepatitis C-infected Cases and Their Correlation with Liver Function Test in Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh India

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Abstract

Introduction: Hepatitis B and Hepatitis C are the major cause of inflammation of the liver. Hepatitis B virus (HBV) belongs to the Hepadnaviridae family and has a circular, partially double-stranded DNA. HBV and Hepatitis C virus (HCV) are the most common cause of chronic liver diseases worldwide.

Materials and Method: It is a type of prospective study, and it was conducted in the Department of Microbiology. Among the patients suffering from HBV and HCV who visited Teerthanker Mahaveer Medical College and Hospital, Moradabad, from March 2015 to January 2016 after obtaining written and informed consent from each patient.

Result: In our study, the total number of 250 cases of Hepatitis B and Hepatitis C were taken. Out of them, the number of positive cases was 172 and negative cases was 78. In our study, among positive and negative cases of hepatitis, the male cases were 134 (53.60%) and 46 (58.97%), respectively, and the female cases were 116 (46.40%) and 32 (41.02%). According to this study, the mean total bilirubin levels of HBV, HCV, and both HBV and HCV were 3.50 ± 5.78, 3.32 ± 13.76, and 1.35 ± 0.75, respectively. The mean serum glutamic-pyruvic transaminase levels were 155.07 ± 192 in HBV, 103.71 ± 178.58 in HCV, and 117.50 ± 43.60 in both HBV and HCV. The mean serum glutamic-oxaloacetic transaminase levels of HBV, HCV, and both HBV and HCV were 332.85 ± 654.82, 119.40 ± 202.48, and 37.50 ± 49.80, respectively. The mean alanine phosphatase and total protein increased levels were found in patients of HBV (121.85 ± 99.72) and both HBV and HCV infection, respectively.

Conclusion: In our country, HBV and HCV are the common causes of liver dysfunction. According to our study, HBV is the major causative agent of liver dysfunction, followed by HCV. Therefore, all the patients of hepatitis must undergo screening of liver function tests.

Key words: Hepatitis B, Hepatitis C, Liver function tests

INTRODUCTION

In India, the etiological role of acute Hepatitis B virus (HBV) and Hepatitis C virus (HCV) is endemic, worldwide chronic liver infection, approximately 300 million cases are infected with HBV and 50-70% of which end up with chronic liver disease.[1] In worldwide, approximately 350 million people are infected with HBV and about 170 million people infected with HCV.[2] The leading cases of hepatocellular carcinoma, liver pathologies, with a very broad clinical spectrum ranging from asymptomatic carrier state to cirrhosis are HBV and HCV.[3]

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HBV is a member of Hepadnaviridae family, which is characterized by the presence of partially double-stranded

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DNA and surrounding the lipoprotein and inner core which infects human and certain animal species such as ground squirrel, woodchuck, and duck.[4] A substantial portion of liver disease in world and infected individual can remain asymptomatic for decades are HBV and HCV. However, 20-30 year later it increased risk of liver cirrhosis, liver failure, and liver cancer become chronic cirrhosis more than 80% of them.[5]

Liver function tests (LFTs) reflect the various functions of the liver. They usually include bilirubin, total protein, alkaline phosphatase (ALP), gamma glutamyl, serum glutamic-oxaloacetic transaminase (SGOT), and serum glutamic-pyruvic transaminase (SGPT). Any abnormality in LFTs gives an idea for the function of liver and enzymes are usually raised in hepatic abnormality with alanine aminotransferase more specific to liver.[6]

Liver disease constitutes a significant health burden. They are from infectious disease to metabolic ones. Viral infections are responsible for significant numbers of liver diseases. Most common of these are HBV and HCV infection.[7] For non-specific symptoms or screening purposes, usually LFT is performed.[8]

The clinical illnesses characterized by nausea, fever, lack of appetite, abdominal pain, acute Hepatitis, and yellowing of the skin can be severe with symptomatic feature lasting for many weeks or month and it can no longer liver function in which the liver is so badly damage and is much less commonly life-threating or fulminate by infection with HBV.[9]

Lymphoid follicles and aggregates, bile duct injury, and fibrosis are included in the histological features of chronic Hepatitis C have been well documented.[10-12] About two million deaths annually are commonly caused by liver cirrhosis, liver cancer, as well as liver failure.[13] Inflammation of liver has many reasons such as toxin, metabolic, viral, pharmacology, or immune-mediate attack on the liver.[14]

In our country, a major cause of the chronic liver disease is HCV. Body piercing including acupuncture and tattooing, unsafe injection, blood products, and improperly screened blood are the source of spread.[15] Regarding the seroprevalence, there are a number of studies of HBV and HCV among the various population groups including healthy blood donors, general public, and hospitalized patients, but out of them Pakistani population is most commonly affected.[16] The aim of our study was to determine the HBV and HCV infected cases and their correlation with liver function test.

MATERIALS AND METHODS

It is a type of prospective study, and it was conducted in the Department of Microbiology, in the patients infected with HBV and HCV who visited Teerthanker Mahaveer Medical College and Hospital, Moradabad, from March 2015 to January 2016 after obtaining written and informed consent from each patient.

Collection of Blood (Serum) Sample

Verbal consent was taken from the patient before the collection of blood sample. 5 ml of blood was collected in 2 ml ethylenediaminetetraacetic acid - vial and 3 ml in plain vial. All age group patients were included. The sample was taken from 250 patients.

Microbiological tests: The following investigations were carried out in each to confirm the diagnosis. Rapid card tests were used for the diagnosis of Hepatitis B and Hepatitis C. Rapid card test for Hepatitis B surface antigen (HBsAg) was used for Hepatitis B and Tri-Dot Rapid card test used for Hepatitis C.

LFTs were checked for all patients included in the study. LFTs included total bilirubin, SGPT, SGOT, ALP, and total protein. LFTs were performed using automatic blood chemistry analyzer (Hitachi 902, Roche Diagnostics, Germany). 5 ml of blood was taken under strict aseptic conditions. HBsAg and anti-HCV antibodies were checked using rapid diagnostic kits (Standard Diagnostics Inc. Korea). For Hepatitis B, about 100 μL blood was placed on test chamber using micropipette. The result was recorded after 20 min. The presence of two bands means a positive result. The presence of only one band signified negative result. For Hepatitis C, about 10 μL blood was placed on test chamber using micropipette. Four drops of assay diluent were placed in the designated chamber by keeping the diluents bottle at 90°C. The result was recorded after 5-20 min. The presence of two bands means a positive result. These were disposable kits; therefore, each kit was used only once and discarded properly after use.

Statically Analysis

The proportion of the positive individuals is expressed in percentage in the total population and determined the prevalence of each viral infection (HBV and HCV). To determine the relationship between age and presence of HBV and Hepatitis C infection risk factor at $P < 0.05$ was employed by Chi-square test.

RESULT

Total 250 cases of Hepatitis B and Hepatitis C were included in this study. There were 134 (53.60%) male

and 116 (46.40%) female, with male to female ratio of 2.09:1.80 as shown in (Table 1). In our study, from the total number of cases of Hepatitis B and Hepatitis C, the number of positive cases was 172 and negative cases was 78 (Table 1 and Figure 1).

In this study, out of 172 (68.80%) positive cases, the cases of HBV were 76, HCV 88, and both Hepatitis B and C were 8 (Table 2). Among HBV, males were 38 (38.78%) and females were also 38 (51.35%). Out of 88 HCV cases, 56 (57.14%) were males and 32 (43.25%) were females; and out of 8 (both HBV and HCV), 4 (4.08%) were males and 4 (5.40%) were female (Table 2 and Figure 2).

Showing the percentage of male and female patients with HBV, HCV, and both HBV and HCV infection. There were no significant differences among them (Table 3).

Stratifying according to the age group among males, the majority of positive cases among HBV was in the age group of 51-60 years was 12 (30%), and among HCV and both HBV and HCV also in the same group, i.e., 51-60 years 22 (39.28%) and 1 (25%), respectively, followed by the other age groups (Table 4 and Figure 3).

Table 1: Hepatitis positive and hepatitis negative cases with percentage (*n*=250)

Test name	Number of patient (%)
Hepatitis positive	172 (68.80)
Hepatitis negative	78 (31.20)
Total	250 (100)

Table 2: Hepatitis (*n*=172) positive cases are distributed in male and female with percentage

Test name	No. of cases (%)	
	Male	Female
HBV	40 (40.82)	36 (48.65)
HCV	56 (57.14)	32 (43.24)
Both HBV and HCV	2 (2.04)	6 (8.11)
Total	98 (100)	74 (100)

HCV: Hepatitis C virus, HBV: Hepatitis B virus

Table 3: Hepatitis (*n*=172) positive cases are distributed in male and female with percentage and Chi-square value and p-value

Test name	No. of cases (%)		χ^2 value	*P* value
	Male	Female		
HBV	40 (40.82)	36 (48.65)	0.755	0.36
HCV	56 (57.14)	32 (43.24)	2.728	0.0986
Both HBV and HCV	2 (2.04)	6 (8.11)	2.265	0.1323
Total	98 (100)	74 (100)		

HCV: Hepatitis C virus, HBV: Hepatitis B virus

The major age group among females that was affected is 51-60 years by HBV were 12 (31.57%) and HCV were 10 (31.25%) and there were no cases of both HBV and HCV. The major age group that was affected by both the HBV and HCV was 21-30 year and 41-50 year 2 (33.33%) each (Table 5 and Figure 4).

According to study, the mean total bilirubin levels of HBV, HCV, and both HBV and HCV were 3.50 ± 5.78, 3.32 ± 13.76, and 1.35 ± 0.75, respectively. The mean SGPT levels were 155.07 ± 192 in HBV, 103.71 ± 178.58 in HCV, and 117.50 ± 43.60 in both HBV and HCV. The mean SGOT levels of HBV, HCV, and both HBV and HCV were 332.85 ± 654.82, 119.40 ± 202.48, and 37.50 ± 49.80, respectively.

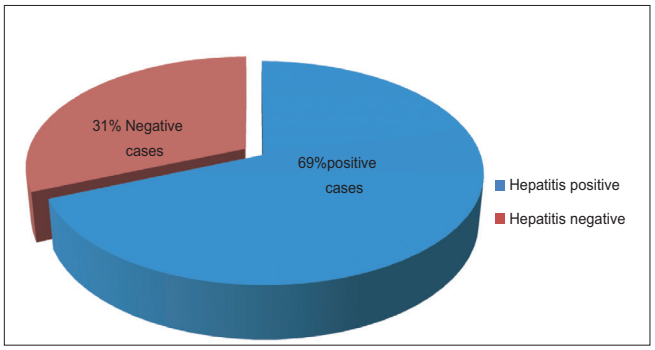

Figure 1: Hepatitis positive and negative cases (*n* = 250)

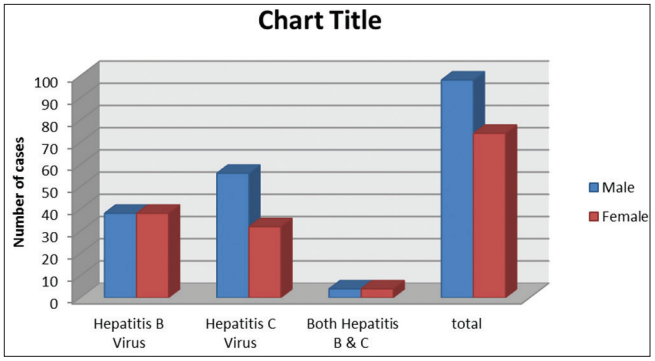

Figure 2: The distribution of male and female (*n* = 172)

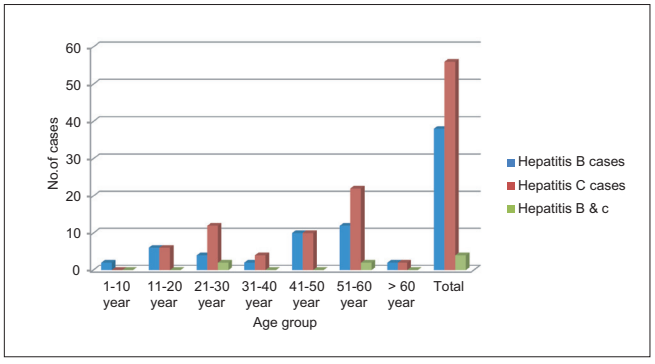

Figure 3: Age-wise distribution of Hepatitis B virus, Hepatitis C virus, and both Hepatitis B and C in male (*n* = 98)

Table 4: Age-wise distributions of Hepatitis B and C in male with percentage (*n*=98)

Age of patients	HBV (%)	HCV (%)	Both HBV and HCV (%)	Total
1-10	4 (10)	0 (0)	0 (0)	4
11-20	6 (15)	6 (10.71)	0 (0)	12
21-30	4 (10)	12 (21.42)	1 (25)	17
31-40	2 (5)	4 (7.14)	0 (0)	6
41-50	10 (25)	10 (17.85)	0 (0)	20
51-60	12 (30)	22 (39.28)	1 (25)	35
>60	2 (5)	2 (3.57)	0 (0)	4
Total	40	56	2	98

HCV: Hepatitis C virus, HBV: Hepatitis B virus

Table 5: Age-wise distributions of HBV, HCV, and both HBV and HCV in female (*n*=74 cases) with percentage

Age of patients	HBV (%)	HCV (%)	Both HBV and HCV (%)	Total
1-10	1 (2.63)	0 (0)	0 (0)	1
11-20	5 (15.79)	4 (12.5)	0 (0)	9
21-30	7 (21.05)	8 (25)	2 (33.33)	17
31-40	4 (10.53)	2 (6.25)	0 (0)	6
41-50	5 (13.15)	6 (18.75)	2 (33.33)	13
51-60	12 (31.57)	10 (31.25)	2 (33.33)	24
+61	2 (5.26)	2 (6.25)	0 (0)	4
Total	36	32	6	74

HCV: Hepatitis C virus, HBV: Hepatitis B virus

Table 6: The mean value of biochemical parameter hepatitis correlation with liver function test (*n*=172)

Parameters	Group of hepatitis positive patients			Normal value
	Hepatitis B (*n*=40)	Hepatitis C (*n*=56)	Both B and C (*n*=2)	
Total bilirubin	3.50	3.32	1.35	0.2-1.0 mg/dl
SGPT	155.07	103.71	117.50	5-45 g/dl
SGOT	332.85	119.40	37.50	5-40 g/dl
ALP	121.85	116.42	83.0	20-140 IU/l
Total protein	12.38	9.93	36.25	6.0-8.3 g/dl

ALP: Alkaline phosphatase, SGOT: Serum glutamic-oxaloacetic transaminase, SGPT: Serum glutamic-pyruvic transaminase

The mean ALP and total protein increased levels were found in patients with HBV (121.85 ± 99.72) and both HBV and HCV infection, respectively (Table 6; Figure 5).

The values of LFTs in Hepatitis B, Hepatitis C, and both Hepatitis B and C, male and female patients were given in Tables 7 and 8, respectively. The Tables 8 and 9 present the mean value of the given test in Hepatitis B and Hepatitis C patients.

DISCUSSION

In this study, HCV-infected male was more than the female patient. Our study is similar to the study of Adoga *et al.*[17] Many diseases are caused by liver dysfunction, mostly HBV

Table 7: The mean value of biochemical parameter in male's Hepatitis B and Hepatitis C patient (*n*=98)

Parameters	Group hepatitis patients			Normal value
	Hepatitis B (*n*=40)	Hepatitis C (*n*=56)	Both B and C (*n*=2)	
Total bilirubin	3.50	3.32	1.35	0.2-1.0 mg/dl
SGPT	155.07	103.71	117.5	5-45 mg/dl
SGOT	332.85	119.40	37.50	5-40 mg/dl
ALP	121.85	116.42	83.0	20-140 IU/l
Total protein	12.38	9.93	36.25	6.0-8.3 mg/dl

ALP: Alkaline phosphatase, SGOT: Serum glutamic-oxaloacetic transaminase, SGPT: Serum glutamic-pyruvic transaminase

Table 8: The mean value of biochemical parameter in females Hepatitis B and Hepatitis C patients (*n*=74)

Parameter	Group hepatitis patients			Normal value
	Hepatitis B (*n*=36)	Hepatitis C (*n*=32)	Both B and C (*n*=6)	
Total bilirubin	2.05	2.39	1.11	0.2-1.0 mg/dl
SGPT	112.92	116.13	63.33	5-45 g/dl
SGOT	126.42	122.45	68.35	5-40 mg/dl
ALP	135.14	111.0	101.67	20-140 IU/L
Total protein	6.26	9.11	8.88	6.0-8.3 g/dl

ALP: Alkaline phosphatase, SGOT: Serum glutamic-oxaloacetic transaminase, SGPT: Serum glutamic-pyruvic transaminase

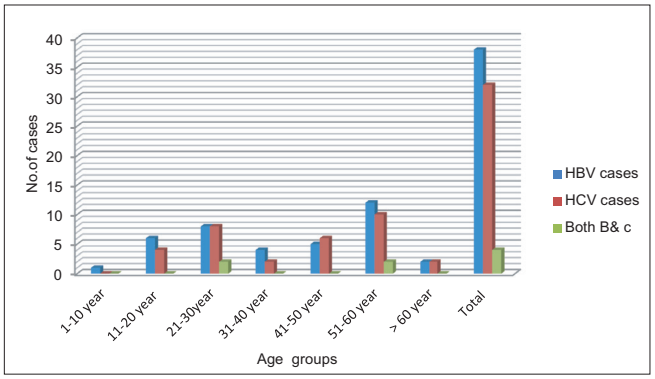

Figure 4: Age-wise distribution of Hepatitis B virus, Hepatitis C virus, and Both Hepatitis B and C virus in female (*n* = 74)

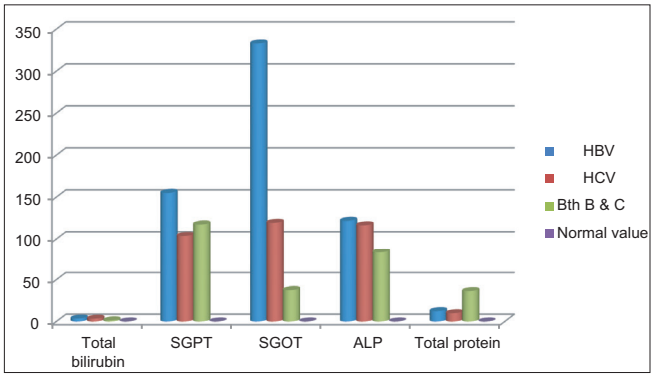

Figure 5: Biochemical parameters mean value correlation with liver function test of infected Hepatitis positive patients (*n* = 172)

and HCV are the viruses that cause viral infection in the liver. HBV and HCV are the viruses among hepatitis viruses causes viral infection of the liver, it accounts for significant amount of liver disease especially in South Asia.[2]

Hepatitis B and C infections are prevalent in different parts of the world from region to region and from one population to another in a country or region (Zali *et al.*, 1996).[18] According to our study, the prevalence among the patients HBV, HCV, and both HBV and HCV were 76 (41.18%), 88 (57.16%), and 8 (4.65%), respectively. Our study is comparable with the study of the Khan *et al.*[19] According to that study, HBV, HCV, and both HBV and HCV were 75%, 23%, and 2%, respectively.

According to the gender, our study shows that among HBV, males were 38% and females were 51.35%, among HCV males were 57.14% and females were 43.25% while among both HBV and HCV males and females were 4.08% and 5.04%, respectively, which is comparable to the study of Tungtrongchitr *et al.*[20] The major age group among male and female which caused by HBV, HCV, and both HBV and HCV were same that is 51-60 year and our study is comparable with the study of Zainal *et al.*[21]

In our study, all the biochemical parameters are highest among the HBV except total protein that is highest among both HBV and HCV patients, which is comparable with the study of Anjum *et al.*[6]

CONCLUSION

In our country, HBV and HCV are a common causative agent of dysfunction of liver. According to our study, HBV is the major causative agent of liver dysfunction, followed by HCV. Among Hepatitis patients, SGPT and SGOT are the LFTs, which are raised. Therefore, all the patients of Hepatitis must undergo screening of LFTs.

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