

CONTRIBUTION OF HEPATITIS B VIRUS & HEPATITIS C VIRUS TO LIVER COMPLICATIONS IN DIFFERENT AREAS OF KARACHI

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Abstract— Liver diseases are a serious burden and cause high cost in terms of human suffering as well as premature loss of productivity. Viral hepatitis is the eighth highest cause of mortality globally. Pakistan ranks 2nd in the countries having highest hepatitis C prevalence in the world. Each year, about 400 people die due to Hepatitis B or Hepatitis. Hepatitis, viral or non-viral, may lead to very serious complications if not treated at early stages. These complications include liver cirrhosis, hepatocellular carcinoma, edema, ascites portal hypertension, anemia, hematemesis, melena and neurological complications.

This study was conducted to identify the major complications caused by hepatitis B virus (HBV) and hepatitis C virus (HCV) in different areas of Karachi. A total of 100 patients diagnosed with hepatitis B or hepatitis C were included. Data was collected from different government hospitals through a systematically designed questionnaire about hepatitis B and hepatitis C. Data was entered and analyzed in SPSS'16 and variables are summarized as frequencies and percentages.

Our study shows that hepatitis C cause more complications as compared to hepatitis B. The main complications caused by hepatitis C virus included liver cancer (2%), liver cirrhosis (4%), edema (36%), ascites (18%), anemia in 2% of HBV patients and 56% of HCV patients, Hematemesis (2%), melena (23%), hepatic encephalopathy (7%), abnormal bleeding time (6%) and elevated liver enzymes in 4% of HBV patients and 60% of HCV patients.

KEYWORD: Viral hepatitis, hepatitis B virus, hepatitis C virus, Liver, Cirrhosis.

1 INTRODUCTION

The liver is one of the vital organs of human body which possess remarkable restorative and regenerative properties (1). The main functions of liver include: Synthesis & Secretion of bile, Bilirubin Metabolism, Blood storage, Metabolic detoxification, Clotting Factors synthesis, Nutrients Metabolism & Storage of vitamins and minerals. Stress to hepatocytes by any noxious agent or hepatotoxic agent may lead to damage and can cause Acute liver injury which is reversible and follow same pathway as wound healing. The endpoint for most of the liver injuries of chronic type is hepatic fibrosis (2). As hepatic fibrosis progress, it converts into cirrhosis which produces even worst consequences such as liver failure and often requires a hepatic transplant (3). Liver diseases are a serious burden and cause high cost in terms of human suffering. They promote seeking doctor's help and hospital visits, as well as premature loss of productivity. One of these diseases is hepatitis. Liver inflammation is termed as hepatitis. It may present as acute (recent infection of rapid onset) or chronic forms (4).

Hepatitis is divided into 2 broad categories: Viral Hepatitis and Non-viral Hepatitis. Viral hepatitis has become a serious public health issue in Pakistan (5) however, it is a pre-

ventable disease (6). Six different types of hepatotropic viruses have been identified i.e. hepatitis A, B, C, D, E, & G virus. The major transmission route of hepatitis B, C, & D virus is through body fluids while hepatitis A and E are transmitted by consuming contaminated food and water (7). Apart from these viruses, yellow fever virus, Dengue virus, Herpes simplex virus, Cytomegalovirus, Epstein-Barr virus, Ebola virus, Measles virus, Rubella virus and Varicella virus may also bring change in liver architecture and cause hepatitis (8), (9).

Non-Viral Hepatitis results from different causes like over-use of alcohol, direct hepatotoxicity, idiopathic hepatotoxicity, Cholestatic reactions, metabolic and autoimmune disorders, and other infectious agents (10).

Most commonly, hepatitis B and C virus cause chronic state of hepatitis which further proceed to liver cirrhosis and liver cancers (hepatocellular carcinoma).

Hepatitis B virus (HBV) is a small, DNA virus that belongs to the family Hepadnaviridae (11). HBV is commonly transmitted through body fluids including blood, semen, and vaginal secretions. It sometimes is also called 'the silent killer' because of the reason that infected adults often remain undiagnosed and thus untreated until it is too late

(12). Approximately 350 million people globally have chronic Hepatitis B (13). The symptoms of hepatitis B (HB) include anorexia, nausea, vomiting, fever, weakness, abdominal pain & Jaundice. The incubation period is about one to four months and the clinic picture are variable with acute and chronic hepatitis B (14). Before the onset of acute hepatitis, there's a prodromal phase in which serum sickness like syndrome occurs with fever, rashes & arthralgia (15).

Hepatitis C virus (HCV) was discovered as the major causative factor of non-A & B viral hepatitis (16). HCV is a plus stranded RNA virus that belongs to family Flaviviridae (17). Around 10 million people are presupposed to be infected with HCV in Pakistan (18). It is divided into eleven different genotypes out of which genotype 26 3a is most common in Pakistan (19). The major routes of transmission of HCV include blood transfusions, unsafe use of injections, unprotected sex, needles reuse of ear or nose piercing, tattooing, shaving from barbers, unsterilized dental and surgical instruments (19). In blood donors and in general population the frequency of HCV is 3.0% and 4.7% respectively. In pregnant females the frequency is higher i.e. 7.3% (20). Clinical manifestations differ in acute and chronic conditions. In acute state there is asymptomatic condition most often and it leads to chronic infection which is diagnosed when cirrhosis or hepatocellular carcinoma occurs. Signs and symptoms are nonspecific like nausea, vomiting, anorexia, weight loss, jaundice, malaise and right upper quadrant pain (21).

In Pakistan according to a report Hepatitis C was more common infection (55.8 %) than Hepatitis B (32.6 %). HB rooted a decade earlier among different age groups than HC (22).

The incubation period of hepatitis varies depending on the type of hepatitis virus. Usually, many patients infected with hepatitis A, B, and C shows few or no symptoms of illness. For those who develop symptoms, commonly have Nausea, Vomiting, Anorexia, Weight loss, Fever, Weakness, Fatigue, Abdominal pain, Diarrhea, constipation and Joint pain. Hepatitis is mostly manifested with Jaundice, Changes in urine and stool, Pruritus and Hematemesis (23) (24).

The inflammation associated with a hepatitis infection can lead to extensive liver scarring (cirrhosis), which may impair the liver's ability to function. Alcohol and hepatitis B and C are common to cirrhosis, although there are many other causes as well. Cirrhosis and other chronic infectious conditions with HBV, HCV, alcoholic liver disease, and non-alcoholic steatohepatitis (NASH) (25) have been known to establish Hepatocellular carcinoma (HCC). Moreover anemia, portal hypertension, Hepatic encephalopathy (HE), edema & ascites are also the complications associated with hepatitis.

Percutaneous exposure to HBV and HCV contaminated blood remains the most prevalent mode of transmission of these viruses, hence the most common cause of HB & HC in Pakistan (26). Each year, over 1.5 million pints of blood

are collected in Pakistan (27). There is a very high prevalence of hepatitis B and hepatitis C in multi transfused population. Unfortunately, there is very limited data available about the practices of blood banks in Pakistan (28). Non-percutaneous infections include Perinatal transmission, Sexual contact, Intranasal transmission, Socio economic status, gender, age and occupation.

This study was aimed to identify the potential risk factors for transmission of HBV & HCV, clinical manifestations and its complications among residents of Karachi, Pakistan.

2 MATERIAL AND METHOD:

This study was done in Pathophysiology Research Unit, Department of Physiology, University of Karachi under the supervision of Dr. Lubna Naz in year 2017.

2.1 DATA COLLECTION:

Data was collected from Jinnah Postgraduate Medical Centre (JPMC), Abbasi Shaheed Hospital, Civil hospital & Sindh Government Hospital. Informed verbal consent was taken from all the subjects.

2.2 STUDY PROCEDURE:

A sample of 100 patients diagnosed with hepatitis B (HBV) or (HCV) infections was selected randomly from the ward. The case definition of HBV and HCV was based on the basic serological markers (Centre for disease control & Prevention, 2008).

Patients history was taken through a structured questionnaire filled by personal interviews from the patients or their attendants. The questionnaire was comprised of questions regarding all the basic information of the patient including demographic and socioeconomic attributes i.e. locality, age, gender, education, occupation, religion, marital status). History of past diseases & vaccination status of patients was also determined. Questions about self-medication, tobacco or alcohol use and consumption of energy drinks were also included in the questionnaire.

2.3 BIOCHEMICAL ASSESSMENT:

Complete blood picture i.e. cell counts, hemoglobin, hematocrit, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and platelet count was recorded from patient's blood tests reports. Liver function test (LFT) reports were also examined for the determining levels of Aspartate transaminase (AST), Alanine transaminase (ALT), gamma-glutamyl transferase (GGT), direct bilirubin, indirect bilirubin and total bilirubin. Hemostatic factors like Prothrombin time (PT), activated partial thromboplastin time (APTT) & INR were noted to determine the hemostatic status of the patients. Results from ultrasonography and biopsy were also recorded to determine hepatocellular carcinoma (HCC), hepatomegaly and cirrhosis. Presence of edema and ascites was based on the visual examination of the patient and the history of weight fluctuations.

3 RESULTS:

Total 100 patients diagnosed with HB and HC were included out of which 53% were male and 47% were female.

Gender		HBV	HCV
Male	53%	4%	49%
Female	47%	2%	45%

Table I: Gender and diagnosis

Most of the patients about 27% were between 25 to 35 years of age whereas the least people with disease were between 15 and 25 years of age. 78% patients were married individuals and the rest (22%) were unmarried. The vaccination status of the patients is found to be highly dissatisfactory. (Refer table II).

Vaccination Status	Percentage
Hepatitis A	52%
Hepatitis B	55%
Pneumonia	53%

Table II: Vaccination Status:

Complications	HBV (n=6)	HCV (n=94)	Percentage
Edema	0	36	36%
Ascites	0	18	18%

Components	HBV (n=6)	HCV (n=94)	Reference Range
Hemoglobin (mg/dl)	12.17 ± 0.543	10.8 ± 2.04	12-17.5 gm/dl
Hematocrit (%)	30.36 ± 1.76	31.89 ± 2.49	36-60%
MCV (fL)	68.36 ± 30.6	84.85 ± 6.45	58-79 fL
RBC	4.76 ± 0.13	4.47 ± 0.84	4.7-6.1 × 10 ¹² /L
TLC/mm ³	3.9×10 ⁴ ± 4.4×10 ³	8.3×10 ⁴ ± 11.6×10 ³	5-10 × 10 ⁹ /L

Table IV: Complete blood picture of patients with HBV and HCV

Anemia	2	56	58%
Hematemesis	0	2	2%
Melena	0	23	23%
Cirrhosis	0	4	4%
Hepatic encephalopathy	0	7	7%
Hepatocellular Carcinoma	0	2	2%
Abnormal Bleeding time	0	6	6%
Elevated liver enzymes	4	60	64%

Table III: Complications in HBV and HCV

Bilirubin	HBV	HCV	Reference Range
Direct Bilirubin (mg/dl)	0.3	0.40 ± 0.31	<0.3 mg/dl
Indirect Bilirubin (mg/dl)	0.1	0.55 ± 0.38	<0.8 mg/dl
Total Bilirubin (mg/dl)	0.95 ± 0.45	1.75 ± 4.42	0.3-1.0 mg/dl

Table VI: Bilirubin levels in patients with hepatitis B & hepatitis C

Parameters	Mean Value	Reference Range
aPTT (sec)	42.5 ± 18.9	20-34 sec
PT (sec)	17.4 ± 7.6	10.4-13.4 sec
INR	1.67 ± 0.59	0.9-1.14
Platelets/mm ³	1.3x10 ⁵ ± 3.75x10 ³	1.5x10 ⁵ -4x10 ⁵ /mm ³

Table VII: Hemostatic Parameters of patients with HBV and HCV

History of surgery, blood transfusions, liver diseases in family and no hepatitis B vaccine were considered as the main risk factors and their percentage was recorded as 6%, 2%, 17% and 45% respectively

4 DISCUSSION:

The prevalence rate of hepatitis is very high and Pakistan the reason being lack of proper health facilities, poor economic status and lack of public awareness. The clinical course and sequel of acute and chronic hepatitis vary among individuals ranging from asymptomatic carrier

state to self-limiting infection or fulminant hepatic failure, chronic hepatitis with progression to cirrhosis and hepatocellular carcinoma.

Our study shows that the prevalence of hepatitis C (94%) is found to be higher than hepatitis B (6%) among the residents of Karachi. This might be due to the progression of HC in chronic forms and long-term disease period of HCV. Moreover, the mean age of participants infected with HB was 35 years and for HC was between 35 to 55 years.

A finding suggests that the virus of hepatitis B is endemic in low socioeconomic populations (29). Similarly, according to (30), positivity of hepatitis C infection can be correlated to low socioeconomic status. This survey supports these studies as most of the patients (90%) belonged to a lower socio-economic class.

(31) found that overall there was no difference observed in the marital status of patients infected with HBV versus HCV and mode of transmission was identified as the only predictor of patient's marital status. However, our results revealed that a large proportion of married individuals (78%) suffer from different forms of hepatitis, especially hepatitis C as compared to unmarried individuals (22%).

Development of fluid retention is a hallmark of liver decompensation and increases mortality rate in cirrhotic patients (32). 54% of the patients from our survey were suffering from edema & ascites. A large cohort study reveals the risk for hepatocellular carcinoma is found to be increased by 15-fold after 65 years of age. In our study, 2 patients with HCV infection & increased age had hepatocellular carcinoma.

Most of the patients had slightly low RBC count & hematocrit level with elevated WBCs.

Aminotransferase levels are considered the clinical indicators of liver health (33) are found to increase significantly in patients with HBV and HCV (34). The AST levels of our

Live function test	HBV	HCV	Reference Range
AST (IU/L)	16.5 ± 9.19	39.37 ± 45.5	5-40 IU/L
ALT (IU/L)	58.83 ± 43.4	58.3 ± 36.85	5-35 IU/L
ALP (mg/dl)	75.6 ± 23.02	98.45 ± 12.48	30-120 mg/dl
GGT (IU/L)	28 ± 7.07	68.12 ± 147.7	10-48 IU/L

Table V: Liver function tests of patients with HBV and HCV

participants were slightly elevated in Hepatitis C patients and normal in hepatitis B patients, whereas, ALT was significantly elevated in both the groups with elevated GGT levels in hepatitis C patients (mean=68.12 IU/L).

A study conducted at Liaquat university hospital, Jams-horo showed that 88% patients with chronic state of liver disease had elevated PT and 71% had elevated aPTT and our survey support this hypothesis.

5 CONCLUSION:

Overall our results show that frequency of hepatitis C is greater than Hepatitis B in people of Karachi. Mostly, the acute form of hepatitis B and the chronic form of Hepatitis C was reported in hospitals by the patients. These conditions contributed to different complications like Hepatocellular carcinoma, Cirrhosis, Hepatomegaly, Elevated liver enzymes, Anemia, Edema, Ascites, Neurological complications, abnormal bleeding time, hematemesis and melena. Late diagnosis, lack of awareness and associated frequent exposure with hepatitis risk factors is the major determinant that is responsible for this greater spread of both, HBV & HCV in Karachi.

6 ACKNOWLEDGEMENTS:

I would like to express my sincere gratitude to my supervisor Dr. Lubna Naz for his patience, motivation, enthusiasm, and immense knowledge and for the hard work of my all the co-others.

7 COMPETING INTERESTS:

Authors have declared that no competing interests exist.

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