



## SEROPREVALENCE OF HEPATITIS C VIRUS (HCV) INFECTION AND HCV GENOTYPES IN A TERTIARY CARE HOSPITAL

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### ARTICLE INFO

#### Article History:

Received 15<sup>th</sup> April, 2018

Received in revised form 8<sup>th</sup>

May, 2018

Accepted 17<sup>th</sup> June, 2018

Published online 28<sup>th</sup> July, 2018

#### Key words:

Hepatitis C virus, ELISA, Genotyping  
Hepatocellular carcinoma.

### ABSTRACT

**Background:** Hepatitis C virus (HCV) infections account for a substantial proportion of liver diseases worldwide. It is the leading cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma (HCC). Now, HCV poses a major health problem in Punjab, India too.

**Aim:** The aim of the study was to genotype prevalent in malwa region of Punjab in cirrhotic patients.

**Material & Methods:** This study was conducted from June 2016- March 2018 during which blood samples were collected from patients Indoor and outdoor patients attending Tertiary care Hospital Patiala. Five ml venous blood sample was collected and processed in VRDL, Department of Microbiology. HCV was detected by using HCV Tridot - rapid visual test (J. Mitra & Co. Ltd.) and ELISA (3<sup>rd</sup> generation ERBA kits). Quantitative HCV RNA was performed as baseline in all persons who came positive for anti-HCV by ELISA followed by HCV genotyping in hepatitis C patients who have liver cirrhosis.

**Results:** out of 17614 patients 1217 (0.069%) were positive for HCV. Out of 1217 HCV positive cases, 250 patients were having cirrhosis. Genotype 3 (n=139) was the most common genotype among cirrhotic patients followed by Genotype 1(n=69), genotype 4 (n=40) and genotype 5(n=2). No case with genotype 2 and 6 were detected among cirrhotic patients in our study.

**Conclusion:** As reported in rest of India genotype 3 was the most common genotype in Malwa belt of Punjab. So early detection and genotyping can help in treatment strategies followed by physicians to cure HCV positive patients.

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## INTRODUCTION

Viral hepatitis which causes acute and chronic sequelae, is an important problem worldwide including India. About 1 million deaths per year are attributed to viral hepatitis infections. World Health Organization (WHO) estimates that approximately 170 million people are infected with hepatitis C virus (HCV).<sup>1</sup> In India about 20 million people are known to have HCV infection and 30% of them expected to develop chronic liver disease i.e cirrhosis and/or hepatocellular carcinoma (HCC). In Punjab, HCV poses a significant problem, owing to the higher prevalence of risk factors like unsafe medical practices and intravenous drug use.<sup>2</sup>

HCV was discovered by Harvey J.Alter in 1989. HCV is a single-stranded RNA virus possessing an icosahedral capsid and an envelope. It belongs to the genus Hepaci virus and is a member of the family Flaviviridae.<sup>2</sup> Its genome is 9.6-kb long and has two untranslated regions at its 5' and 3' ends and contains a single open reading frame. A host signal peptidase in the structural region and viral encoded proteases in the nonstructural region cleave this polyprotein into 10 single peptides. The core protein and the envelope glycoproteins E1

and E2 are the structural proteins and the nonstructural proteins include the p7, NS2, NS3, NS4A, NS4B, NS5A, and NS5B. An estimated 10 trillion virion particles can be produced per day during the active phase of infection due to an active viral replication. HCV virus has six genotypes numbered 1-6 and there is a significant genotypic variation across various geographic regions globally.<sup>1,4</sup> Genotype 1 predominates in Europe, North America, and Australia while genotype 3 is more prevalent in Asian countries namely India, Pakistan, Bangladesh, etc.<sup>6,7</sup> Detection of HCV remains an issue of major concern. Early diagnosis of infection is important as it helps the clinician to commence treatment so as to prevent the progression of the disease to chronic active hepatitis, cirrhosis and hepatocellular carcinoma. At the same time the diagnosis of hepatitis C infection has a personal impact in the form of lifestyle changes like reduced work hours or alcohol intake which indirectly influences economic status and social participation.<sup>9,10</sup>

The diagnosis of HCV involves the detection of the anti HCV antibody but nucleic acid testing (NAT) remains the gold standard. At the same time, performing these tests in a routine clinical laboratory might pose difficulties due to the

requirement of technical expertise, costly equipment, reagents and special procedure areas. Tests used for detecting HCV antibodies fail to differentiate acute infection from past resolved infection and false positivity. This difficulty is overcome by further testing for HCV RNA using nucleic acid testing.<sup>10</sup>

**MATERIAL AND METHODS**

This study was conducted from June 2016 to March 2018, during which 17614 blood samples were collected from patients from in-door and out-door patients of tertiary care hospital. Five ml venous blood sample was collected and processed in VRDL, Department of Microbiology. The blood was allowed to clot for 45 min at room temperature and the serum was separated after centrifugation at a low speed which was further used to perform requested tests. The tests were done according to the manufacturer's instructions. HCV antibody testing was done with Rapid test and on positive cases ELISA test (3<sup>rd</sup> generation Erba) was performed. Before starting the treatment, quantitative HCV RNA was performed as baseline in all persons who came positive for anti-HCV by ELISA. HCV genotyping was done in hepatitis C patients who had liver cirrhosis. Their genotyping was done by Linear array HCV-genotyping kit (Roche Diagnostics, Mannheim, Germany) from an accredited laboratory and results were compiled.

**RESULTS**

Out of 17614 patients 1217 (6.9%) were positive by ELISA test. Maximum number of patients (n=538) were in the age group of 41- 60 yrs while minimum (n=41) were in the age group of 0- 20 yrs (Table-1). Out 1217 cases HCV positive cases, 671 patients were with liver involvement and out 671 patients, 250 (20.5%) patients were having cirrhosis. Maximum number of patients were in the age group of 41- 60 yrs while minimum were in the age group of 0- 20 yrs (Table-2,3). Mean age of the patients was 43.2. Male to female ratio was 4:1. Out of 250 cirrhotic patients, 172 patients were from rural background while 78 were from urban background (Table-4). Genotype 3 (n=139) is the most common HCV genotype, followed by genotype 1 (n=69), genotype 4 (n=40) and genotype 5 (n=2). No case with genotype 2 and Genotype 6 was found in present study (Table-5).

**Table 1** Age wise distribution of HCV ELISA Positive cases

Age group (years)	Male	Female	Total
0-20	32	9	41
21-40	290	172	462
41-60	364	174	538
>60	100	76	176
Total	786	431	1217

**Table 2** Genotype of HCV Positive cases with liver involvement (n=671)

Genotype	Genotype 1	Genotype 2	Genotype 3	Genotype 4	Genotype 5	Genotype 6	Total
Male	147	Nil	219	72	2	Nil	440(71.3%)
Female	75	Nil	112	43	1	Nil	231 (34.4%)
Total	222	Nil	331	115	3	Nil	671(100%)

**Table 3** Age wise distribution of HCV Positive cases with cirrhosis (n=250)

Age group (years)	Male	Female	Total
0-20	4	1	5
21-40	30	11	41
41-60	110	44	154
>60	22	28	50
Total	166	84	250

**Table 4** Area wise distribution of HCV Patients with Cirrhosis

Rural	Urban	Total
172 (68.8%)	78(31.2%)	250(100%)

**Table 5** Genotype of HCV Positive cases with cirrhosis (n=250)

Genotype	Genotype 1	Genotype 2	Genotype 3	Genotype 4	Genotype 5	Genotype 6	Total
Male	46	Nil	94	25	1	Nil	166(66.4%)
Female	23	Nil	45	15	1	Nil	84 (33.6%)
Total	69	Nil	139	40	2	Nil	250 (100%)

**DISCUSSION**

HCV infections are responsible for liver diseases worldwide. Chronic HCV infection may cause liver cirrhosis and hepatocellular carcinoma (HCC) over the course of twenty to thirty years. The HCV genotypes may be related to disease progression and are associated with the response to antiviral therapy. Therefore, further understanding of the clinical relevance and therapeutic implications of the HCV genotype is crucial for designing individualized therapies for patients with chronic HCV infection.

In present study out of 17614 patients, 1217 (6.9%) patients were anti HCV positive which is similar to the study done by Jindal *et al* in Faridkot, Punjab, they reported HCV seroprevalence in 6.75% cases.<sup>19</sup> In other studies conducted in different parts of India reported very less seroprevalence rate of HCV i.e 1.7% in Jaipur and 1.57% in a study in Cuttack, Orissa..<sup>14,15</sup> In ideal situations proper detection of HCV should be done by using both screening and confirmatory tests so as to avoid unnecessary stigma to the patients.

The overall prevalence of anti HCV positivity in cirrhotic patients in present study was 250 (20.5%) which is slightly higher than the studies done in north India. In a study conducted by Panigrahi AK *et al* in AIIMS, New Delhi 1997 reported 13.83% patients with acute hepatitis and chronic liver diseases were positive for anti-HCV antibody.<sup>15</sup> In another study by Suri *et al* reported an overall prevalence of anti HCV positivity in acute and chronic hepatitis patients 13.25% and 14.27% in 2010 and 2011 respectively in a tertiary care center of north India.<sup>17</sup>

In present study number of male patients (n=166) were more as compare to females (n=84). Maximum prevalence was seen in age group 41-60 years and from the patients from rural background (n=172). Similar were the results of Sood *et al* who reported 5.2% prevalence in the age group 41-60 years and is more in patients from rural background in Punjab.<sup>18</sup>

In present study genotype 3 (55.6%) is more common followed by genotype 1 (27.6%), genotype 4 (16%) and genotype 5 (0.08%) in cirrhotic patients. Which is similar to the recent study done by Chakravarti *et al* in 2011 in New Delhi, (63%) of cases were infected with genotype 3 followed by genotype 1 in (30.98%) and genotype 2 in (5.63%) of cases. In a study conducted by Jindal *et al* in 2015 from Faridkot, genotype 3 was found to be most common (55.6%) genotype followed by genotype 1 (42.8%) and genotype 4 (1.6%). Similar were the results of the study conducted by Amarapurkar D *et al* at Bombay who reported genotype 1 in 21% cases, genotypes 2 in 25% cases and genotype 3 in 54% cases. Cirrhosis was significantly common in genotype 1 (77%) when compared to genotype 2 and 3 (33%).<sup>19,20,21</sup> No case of genotype 2 and 6 was reported in our study. There is no difference between the

genotype detected in the patients with cirrhosis and without cirrhosis.

## CONCLUSION

State of Punjab has a relatively higher seroprevalence rate of HCV infection than in any other part of the country and poses a significant health care problem. The burden of hepatitis C infection is more in the males especially in the rural areas. The reason for this could be lack of awareness, IVDUs and shortage of health care facilities. Similar to the other geographic belts in India and our neighboring country like Pakistan, genotype 3 predominates in the state of Punjab. Control of HCV infection in Punjab requires focusing on several strategies, like creating awareness, early detection, viral load of HCV positive cases and HCV genotyping as HCV genotypes play important role in pathogenicity, infectivity and response to antiviral therapy against HCV infection. Therefore, detection of genotype is crucial for specific management of HCV infection.

## Conflicts of Interest

Nil

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### How to cite this article:

Rupinder Bakshi et al (2018) 'Seroprevalence of Hepatitis C Virus (Hcv) Infection and Hcv Genotypes in A Tertiary Care Hospital', *International Journal of Current Medical And Pharmaceutical Research*, 04(7), pp. 3453-3455.

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