

Seroprevalence & Epidemiology of Hepatitis C Virus Infections in North India: A Hospital Based Study

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Abstract

Background: Hepatitis C is a global health problem affecting a significant portion of the world's population. Published data in North India on epidemiology, prevalence and risk factors is very limited. This study was carried out to estimate the seroprevalence, associated demographic factors influencing transmission and distribution of hepatitis C virus (HCV) in a hospital-based population in Punjab.

Methods: A total of 16920 serum samples were tested for anti HCV antibodies using commercially available kits, from August 2021 to August 2023. The study highlighted on different epidemiological aspects such as age groups, sexes, likely mode of transmission and probable cause for undergoing screening procedures.

Results: The seroprevalence for anti-HCV-Ab was found to be 1.6%. Multiple blood transfusions, hemodialysis & IV drug abuse were significant risk factors. Sero-prevalence rate of HCV infection was significantly more prevalent (77 %) in male patients. IgM anti HCV reactivity was highest (42%) in age group of 20-40 years.

Conclusions: The study findings, including the overall prevalence of HCV infection, associated risk factors and demographic characteristics, can guide prevention and control efforts against Hepatitis C. The need of the hour is to increase awareness about HCV among the public and practicing physicians.

Keywords: Genotype, hepatitis C virus, risk factors, seroprevalence.

Introduction

HCV infection is a serious health problem in both developed and developing countries.¹ Hepatitis C is a single stranded RNA virus that belongs to the Flaviviridae family. Chronic liver disease (CLD)

and its associated complications like cirrhosis and carcinoma may cause significant mortality, morbidity, and economic burden. Published data show that the burden of CLD is large and increasing, primarily owing to the increasing burden of nonalcoholic fatty liver disease and alcohol-related

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liver disease (ALD)². In 2017 WHO reported that more than 350000 people die every year from HCV-related liver diseases,^{3,4} Six major genotypes 1-6 have been identified with genotype 1 being the most prevalent genotype globally (46%), followed by genotype 3 infecting 22% and genotype 2 and 4 infecting 13% of patients.⁵

Despite of easy availability of effective antiviral treatments in the country the burden of disease in general population has not come down. However, due to the asymptomatic nature of hepatitis C and lack of routine medical examinations, a large group of HCV infected individuals with low-grade viremia remain unaware of their infection status for years and therefore, do not pursue treatment until the symptomatic stage of liver impairment.⁶

Hepatitis C virus (HCV) infections progressively lead to liver impairment, cirrhosis and hepatocellular carcinoma.⁷ Since the discovery of HCV in 1989, these infections continued to propagate across the globe despite extensive research to understand various aspects of the virus and the disease.⁸ The impact of this infection is also emerging in India due to flaws in India's blood-banking system and non-implementation of international standards concerning blood transfusion, reuse of unsterilized needles, syringes and surgical instruments by quacks and menace of intravenous drug abuse.⁹ North India has high occurrence of risk factors for HCV infection & it poses a significant problem in the state of Punjab, owing to the higher prevalence of risk factors like unsafe medical practices (including unsafe injections and dental procedures) and intravenous drug use.¹⁰ There is paucity of published data on epidemiology of Hepatitis C infection in North India, particularly in Punjab.

Population-based studies on prevalence of HCV infection in India are scarce. Most of the available data are based on blood bank screening, which may not be a reliable indicator of the true infection rate. Present study was undertaken to evaluate the frequency of HCV infection in the randomly selected population presenting to a tertiary care hospital in Punjab and to assess the prevalence rate of HCV infection in the different age groups and any sex differentiation in the prevalence of HCV infection in this population.

Methods

This study was undertaken in a tertiary care hospital in Punjab, India. A total of 16920 serum samples were tested. Blood samples were randomly collected from August 2021 to August 2023 for detecting the presence of Hepatitis C infection. Inclusion criteria included all the patients 13 year and above with consent (guardian /parent consent for below 18 years) among admitted or attending OPD in the hospital and were undergoing these serology tests as part of routine pre-operative screening or for diagnostic purposes. All those who did not give consent to be the part of research were excluded from the study.

Five millilitre of blood was collected aseptically by venepuncture into sterile, disposable vacutainers without anticoagulants & labelled with patient identification details. Sample was allowed to clot at room temperature for about 1 hour for clot retraction. Serum separation was done by centrifugation at a speed of 3000 rpm for 10 minutes & stored up to 48 hours at 2°- 8°C, and was subjected to qualitative detection of IgM Anti-HCV antibody by indirect third generation ELISA method. All samples were tested as per the manufacturer's instructions with adequate quality control & the absorbance value were read at 450nm as reference wavelength by ELISA reader.

All HCV reactive patients were analysed on the basis of their demographic profiles, probable reason for testing, symptomatic evidence & probable mode of transmission

Patients were reviewed for HCV acquisition, viz. blood transfusion, surgery, needle stick injury, tattooing, unprotected intercourse with multiple sexual partners, alcohol consumption and intravenous drug abuse etc.

The data was evaluated using Microsoft Office Excel worksheet and percentage and proportions for every variable was calculated. $P \leq 0.05$ was considered to be significant.

Results

During two year of study period, a total of 16920 serum samples were tested for detection of IgM

anti-HCV antibody and prevalence rate of HCV infection was 1.6 % (n=237) (Table 1)

Table 1: Prevalence of Hepatitis C infection among patients in a tertiary care hospital

Age group	Number	Percentage
<20 years	5	2
21-40 years	99	42
41-60 years	81	34
61-80 years	50	21
>80 years	2	1
Mean	47.5	

Table 2: Age distribution in the study group

	Total samples received	No. of positive samples	Percentage of positive sample
Anti HCV antibody	16920	237	1.6%

The mean age of the study population was 47.5 years, ranging from 13-85 years (Table 2). Seroprevalence of HCV was significantly higher in males (73%) as compared to females (27%) in our study (Table 3)

Table 3: Sex prevalence of HCV infection in percentage

	Male	Female
Total no. of anti-HCV Ab positive cases (n=237)	(173)73%	(64)27%

The risk factor profile is depicted in Table 4. Not all the HCV positive patients showed association with risk factors. 46% patients (109) did not have any apparent risk factor for HCV infection, whereas 54% patients had one or more than one risk factors. A total of 42 (17.72%) patients had history of blood transfusion in the past, 21 (8.86%) had history of haemodialysis, 4 patients (1.68%) had history of tattooing, 19 (8%) patients had history of IV drug abuse, and 7(2.95%) had undergone some surgical procedure. History of alcohol consumption was available in 68 patients of which 14 had history of alcohol abuse and rest had social consumption of alcohol.

Table 4: Categorization of Hepatitis C patients according to the risk factors associated

Associated risk factors	No. of HCV infected patients	Percentage of HCV infected patients
H/o alcohol consumption	68	28.69%
Multiple blood transfusion	42	17.72%
Haemodialysis patients	31	13.08%
IV drug abuse	21	8.86%
Multiple sexual partner	11	4.64%
H/o surgical procedure	7	2.95%
H/o tattooing	4	1.68%

Most of the tested patients i.e., 78% (13198) were from Punjab, 22% (3722) were from other parts of the country. Anti-HCV prevalence was higher among rural residents (66%) than urban residents (Table 5).

Table 5: Locality distribution of positive subjects

Locality	Number	percentage
Rural	158	66%
Urban	79	34%
Total	237	

Table 6 depicts distribution of cases as per districts of state. Among the districts of Punjab, the highest frequency distribution of subjects was found in Doaba region. The proportion of persons testing positive for HCV differed by district, ranging from 2.95% in Tarantaran to 13.50% in Jalandhar.

Table 6: Distribution of positive patients according to districts

District (Punjab)	Number	Percentage
Faridkot	10	4.21%
Ferozpur	9	3.79%
Bathinda	12	5.06%
Jalandhar	32	13.50%
Hoshiarpur	16	6.75%
Kapurthala	12	5.06%
Ludhiana	6	2.53%
Gurdaspur	26	10.97%
Moga	16	6.75%

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Muktsar	16	6.75%
Amritsar	29	12.23%
Nawanshahr	18	7.59%
Patiala	11	4.64%
Ropar	12	5.06%
TarnTaran	7	2.95%
Other states	05	2.1%

Discussion

This study assessed the prevalence and risk factors for HCV infection in Punjab and reported an overall prevalence of anti-HCV of 1.6%. We found that males and persons living in rural areas had the greatest odds of being infected with HCV.

In present study, mean age is 47.5 years which is quite similar to a study of symptomatic patients, which reported mean age as 49 and resembles other studies of Chronic Kidney Disease associated HCV with mean age as 48 years.¹¹ In few other studies done on asymptomatic patients in hospital and community, similar mean age 41.89±18.38 years was reported in HCV positive patients,^{12, 13} this may be because the above age groups are most likely to indulge in risky behaviour and practices such as unprotected sex and substance abuse.

Predominant rural distribution of subjects is most likely due to lack of proper health care facilities in rural areas, reuse of unsterilized instruments and syringes by quacks, iv drug abuse and lack of awareness about the prevention and the treatment of this disease among rural people.

In our study, Hepatitis C infection was found to be more prevalent in males as compared to females. This may be because of the fact that males are more prone to harbour the risk factors for this infection like drug abuse and unprotected sex. In a population based study done in Ludhiana, overall prevalence of HCV was found to be similar among males and females.¹⁴ However, in another study done in Faridkot district of Punjab, prevalence of active HCV infection was high (73%) in males as compared to females (26%)¹⁵

The prevalence of HCV was 21% in thalassemia patients and correlated with advancing age as per a study in 2001¹⁶. Studies from Mumbai reported the prevalence of HCV in multiple transfused patients

to be 16.7%.¹⁷ In multiple transfused haemophiliac patients the prevalence of HCV was around 23.9% in western India.¹⁸ In a study from Kolkata the prevalence of HCV was 13% in multitransfused patients¹⁹. Our study re-confirms blood transfusion as the most significant route of HCV

Analysis of study done by Soodetal²⁰ also revealed factors like advancing age, alcoholism & history of blood transfusion, as important risk factors. Another study done on pregnant females concluded most patients had no associated risk factors, similar to this study²¹. One study by Thakral et al done on blood donors, reported history of previous surgery in 25.8% and drug abuse in 6.4%.²² Uttarakhand based population research also revealed, blood transfusion, surgeries in the past as important associated factors²³

The finding that blood transfusion is a risk factor for HCV, highlights the need for improved blood safety practices in Punjab.

Nationwide surveillance of hepatitis C is also lacking in the country and focuses primarily on hepatitis A and E.²⁴ Testing for incident HCV and HBV cases is only supported by the country's national Integrated Disease Surveillance Programme (IDSP) in outbreak situations.²⁴ Fortunately, treatment costs for HCV infection in India have decreased significantly with the introduction of direct acting antiviral drugs in 2015, which have proven to be highly effective.²⁵

A strict control approach is the need of the hour including a mandatory screening of all blood donors and awareness should be implemented on priority. In this study, highest percentage distribution of subjects is found from Doababelt. The reason for this may be due to the fact that the hospital in which study is done is located in this area and more patients from near districts due to relative proximity may approach the hospital.

Conclusion

Hepatitis C is an emerging infection in India whose long term implications will be felt in the decades to come. Present study is very important in depicting the frequency distribution of HCV infection in districts of Punjab. It is a pathogen that is already responsible for a significant proportion of

liver disease in various regions of India. Stringent blood banking laws need to be introduced and reuse of needles should be strictly discouraged. All this is not possible without increased public awareness of the magnitude and implications of this chronic infection and its mode of spread. Health authorities have to include hepatitis C on their radar as a disease which can result in significant morbidity and mortality in the years to come. Though this study is a basic study but will surely help the epidemiologist to go for further detail on epidemiology on HCV. As there is no vaccine available for HCV, the prevention of HCV infection can be achieved by screening of blood and blood products, avoiding sharing of needles or injecting equipment.

Limitation of study: The present study was done in a single centre and needs to be conducted in multiple phases and different centres to detect the true prevalence and burden of the disease.

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