

Sociodemographic Profile, Genotype, and Response to Therapy in Hepatitis C Virus Infection: A Brief Report from Himachal Pradesh

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Profile of Chronic Hepatitis C in Sub-Himalayan region

Setting	Methods	Results
<ul style="list-style-type: none"> • Single center retrospective observational study • September 2019–March 2022 • Patients of chronic hepatitis C 	<p>We assessed</p> <ul style="list-style-type: none"> • Sociodemographic profile • Risk factors for HCV transmission, underlying HCV genotype • Response to therapy 	<ul style="list-style-type: none"> • N= 189, Mean age = 30.9±13.8 years • Majority young males • Most prevalent genotype-3 • 95% Noncirrhotics • SVR 12 ~ 95% • Risk factors <ul style="list-style-type: none"> • Intravenous drug use (61.4%), • Tattooing (11.7%) • Hemodialysis (11.1%).

Conclusion- Intravenous drug use & tattooing important risk factors for HCV infection in Himachal Pradesh



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Abstract

Introduction Hepatitis C virus (HCV) infection is a major cause of liver disease worldwide. There is no data on sociodemographic profile, risk factors, genotype, and response to therapy of HCV infection from Himachal Pradesh.

Methods In this single-center study, we retrospectively analyzed data from HCV-infected patients treated with new oral direct-acting antiviral drugs from September 2019 to March 2022. Data on the sociodemographic profile of HCV-infected patients, along with risk factors for its transmission, HCV genotype, and response to therapy, was analyzed.

Results A total of 189 patients were included, with a mean age of 30.9 ± 13.8 years. Most were males and were students. Predominant risk factor for HCV transmission was intravenous drug use (61.4%), tattooing (11.7%), and hemodialysis (11.1%). A majority of the patients were students (72%). The predominant genotype was GT 3. Most (95.2%) patients were without cirrhosis, so sofosbuvir plus daclatasvir for 12 weeks was the most common regimen used. Sustained virological response was achieved in 94.7% of patients.

Conclusion This study, alarmingly, shows that intravenous drug users and tattooing are important risk factors for HCV infection in Himachal Pradesh. Further, students were the most frequently infected group.

Keywords

- ▶ hepatitis C virus
- ▶ direct acting antiviral
- ▶ hepatitis C virus genotype
- ▶ National Viral Hepatitis Control Program

Introduction

Globally 110 million people are seropositive for hepatitis C virus (HCV) antibodies and about 80 million people have chronic HCV infection.¹ In India, the prevalence of HCV infection is about 0.5 to 1.5%.² Prevalence among hemodialysis (HD) patients is 27.7%,³ in renal transplant recipients 26.2 to 55.9%,⁴ in health care workers 0 to 4%,⁵ and among intravenous drug users (IVDUs) it is up to 55%.⁶ HCV has six major genotypes (GT) 1 to 6. GT 3 is most common genotype from India, accounting for 54 to 80% of cases.^{7,8} Direct-acting antivirals (DAAs) have greatly simplified treatment of HCV infection with cure rate of 90%; however, awareness of the risk factors for infection, access to diagnostic modalities, and RNA testing and treatment facilities are low.⁹

No data is available on sociodemographic profile, HCV genotype, and response to therapy of HCV infection from Himachal Pradesh (HP), a hilly state in the sub-Himalayan ranges of North India. So, this study was conducted to determine the sociodemographic profile of HCV-infected patients along with risk factors for HCV transmission, HCV genotype, and treatment response to new oral DAAs in HP.

Methods

In this single-center study, we retrospectively analyzed data of HCV infected patients treated in our institution in HP from September 2019 to March 2022. All patients were treated with oral DAA drugs free-of-cost treatment under National Viral Hepatitis Control Program.

All patients with HCV infection diagnosed on third-generation ELISA (HCV ELISA- J Mitra and Co. Pvt Ltd, J Mitra and Co Pvt limited. A-180-181, Okhla Industrial Area,

Phase-1, New Delhi-110020, INDIA) followed by confirmatory HCV-RNA quantification (by COBAS Ampliprep/COBAS TaqMan HCV Test, ver 2.0 Roche Molecular Systems, Inc., Branchburg, New Jersey, United States, with lower limit of quantitation of 15 IU/mL). HCV genotype and subtype were determined using LiPA 2.0 genotyping assay or by Sanger sequencing. We excluded those with concomitant infection with hepatitis B and/or human immunodeficiency virus, acute liver failure, aminotransferases more than $10 \times$ upper limit of normal, prior liver transplantation, hepatocellular carcinoma, and previous treatment with DAA was excluded from the study. Plasma HCV RNA levels were evaluated at baseline and then after 12 weeks of completion of treatment for documenting sustained virological response (SVR) at week 12.

The sociodemographic parameters including age, gender, locality, educational status, occupation and addiction patterns of the included patients were studied. Data regarding risk factors for the transmission of HCV infection like IVDU, needle stick injury, high-risk sexual behavior, spouse with HCV infection, body piercing, tattooing, HD, history of blood transfusion, surgery, organ transplantation, injection drug treatment, and hospitalization were analyzed. Evidence of cirrhosis included: AST to Platelet Ratio Index (APRI) score more than 2, or liver stiffness measurement of more than 12.5 kPa on transient elastography and clinical evidence of cirrhosis (e.g., liver nodularity and/or splenomegaly on imaging, platelet count $< 150,000/\text{mm}^3$).¹⁰

The drug regimen used for the treatment of HCV infection was as per national guidelines.¹⁰ Those who did not have underlying cirrhosis received sofosbuvir plus daclatasvir for 12 weeks. Sofosbuvir plus velpatasvir for 12 weeks was administered to those with compensated

Table 1 Baseline sociodemographic characteristics and risk factors for HCV infection in study population

Parameter	Number (n)	Percentage (%)
Gender		
Male	172	91.0
Female	17	9.0
Age group (y)		
11–30	135	71.4
31–50	29	15.3
51–70	20	10.6
>70	5	2.6
Educational status		
Literate	182	96.3
Illiterate	7	3.7
Locality		
Urban	117	61.9
Rural	72	38.1
Occupation		
Students	77	40.7
Unemployed	70	37.0
Government employee	10	5.3
Self-employed	32	17
Risk factors for HCV transmission		
Intravenous drug abuse	116	61.4
Tattooing	22	11.7
Hemodialysis	21	11.1
Prior surgery	8	4.2
No risk factor found	7	3.7
Blood transfusion and therapeutic injections	5	2.6
Sexual exposure	5	2.6
Needle stick injury	4	2.1
Organ transplant	1	0.5

Abbreviation: HCV, hepatitis C virus.

cirrhosis. Those with decompensated cirrhosis were treated either with sofosbuvir plus velpatasvir plus ribavirin for 12 weeks or sofosbuvir plus velpatasvir for 24 weeks, depending on ribavirin tolerance. Those patients who achieved SVR 12 (HCV RNA < lower limit of quantitation 12 weeks after completion of the treatment) were recorded as treatment responders. Statistical analysis was performed using statistical package for social sciences (SPSS) version 22.0 for Windows (SPSS, Chicago, Illinois, United States). Results are displayed in tables and figure, with the categorical variables presented as numbers and percentages and mean \pm standard deviation, as appropriate.

Table 2 Liver cirrhosis, hepatitis C virus genotype, and sustained virological response of study population

Parameter	Number (n)	Percentage (%)	
Cirrhosis	No	180	95.2
	Yes	9	4.8
Hepatitis C virus genotype	1a	14	7.4
	1b	10	5.3
	3a	125	66.1
	3b	16	8.5
	4	5	2.6
	Not available	19	10.1
Sustained virological response	Achieved	179	94.7
	Not achieved	5	2.6
	Not available (lost to follow-up)	5	2.6

Results

A total of 189 HCV infected patients were included in the study, with a mean age of 30.9 ± 13.8 years (range: 16–75 years; **Table 1**). Most were males (91%) aged between 11 and 30 years (71.4%), and they were students (71.9%) predominantly from urban (61.9%) background (**Table 1**). Patients had come from all 12 districts of the state and mostly from districts Shimla (57.1%), Solan (10.6%), and Bilaspur (7.9%). Students constituted the predominant (40.7%) patient population, followed by unemployed adults (37%; **Table 1**). Predominant risk factors for HCV transmission were IVDU (61.4%), tattooing (11.7%), and HD (11.1%; **Table 1**).

Most (95.2%) patients were without cirrhosis, so sofosbuvir plus daclatasvir for 12 weeks was the most common regimen used. The predominant HCV genotype was GT 3a followed by GT 3b, GT1a, GT 1b, and GT 4 (**Table 2**). HCV genotype could not be determined in 19 patients due to logistic issues. SVR was achieved in most patients (94.7%; **Table 2**). In five patients, SVR could not be achieved. Five patients got lost to follow-up and SVR could not be documented on them.

Discussion

In this study, HCV-infected patients were mostly males (91%) and aged between 11 and 30 years (71.4%). Most were students and predominantly from an urban background. Previous studies from Punjab and West Bengal reported high prevalence of HCV infection in the age group of 41 to 60 years and over 60 years, respectively.^{11,12} This difference could be due to the predominant IVDUs and students in our study. A study conducted in the neighboring states of Punjab and Haryana revealed most IVDUs in age group of 18 to 30 years.¹³ In a recent study of the prevalence of hepatitis C among IVDUs from Shimla, HP, all patients were males aged between 21 and 40 years.¹⁴ In a recent study, IVDU as risk factor for HCV

transmission was more common in younger adults with age less than or equal to 30 years in Punjab and Haryana.¹⁵

Predominant risk factors for HCV transmission were IVDU (61.4%), tattooing (11.7%), and HD (11.1%). This is in contrast to previous studies which suggest that the predominant mode of HCV transmission in India is unsafe therapeutic injections and blood transfusion.³ In a study from Northern India, the most common risk factors for HCV transmission were a history of dental treatment and therapeutic injections.⁸ In a recent study, common risk factors for HCV transmission in Punjab and Haryana were previous surgery and IVDU.¹⁵ This contrast in risk factors may be a true epidemiological difference or may be skewed due to the nonepidemiological nature of our study that included only those patients who came to us for treatment. Tattooing has been observed as a common risk factor in our study. Tattooing is prevalent among youth in HP, especially in tourist areas. Most (95.2%) patients had infection with HCV without underlying cirrhosis, so sofosbuvir plus daclatasvir was the most common regimen used for treatment. Most (94.7%) patients achieved SVR. Similar high effectiveness of DAA-based treatment of up to 90% has been reported in other studies, even in public health programs.¹¹

Though the present study is not a true epidemiological study, it may reflect the current trend of acquiring HCV infection through intravenous drug abuse and tattooing among youth. HCV infection in HP is common among young school and college-going male students, and there is a need to combat the menace of intravenous drug abuse to ensure that HCV infection can be controlled.

Authors' Contributions

Brij Sharma, Vishal Bodh, Rajesh Sharma, Ashish Chauhan, and Vineeta Sharma conceptualized the study and designed the protocol. Amit Sachdeva, Rajesh Kumar, Vishal Bodh, Tahir Majeed, Mir Bilal, and Dikshant Sharma collected and analyzed the data. Vishal Bodh, Rajesh Kumar, and Brij Sharma prepared initial draft of the manuscript. Vishal Bodh, Rajesh Sharma, and Tahir Majeed critically revised the manuscript. Brij Sharma and Vineeta Sharma provided administrative, technical, and material support. Brij Sharma, Vishal Bodh, Rajesh Sharma, and Vineeta Sharma supervised the study.

Ethical Approvals and Consent

Since our study retrospectively analyzed the data maintained in our gastroenterology department so ethical approval and consent were not sought.

Conflict of Interest

None declared.

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