

# Sociodemographic features associated with Hepatitis C Virus (HCV) in pregnant females: A tertiary care centre study from Malwa region of Punjab (North India)

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## ABSTRACT

**Background:** Hepatitis C virus (HCV) infection is high in state of Punjab, however very few studies have been done till date. We all know that pregnant females are a most important section of our community and are usually screened for HCV, HIV, and Hepatitis B at time of presentation. HCV is capable of causing chronic infections and having long-term implications on a person's health. Vertical transmission of HCV can be one of the major route of transmission of this virus to the neonate and there have been various sociodemographic factors like age, literacy, socioeconomic status, occupational status, associated with the disease causation and transmission. **Methods:** All pregnant females attending Obstetrics and gynecology department of our institute were included in study. All the sociodemographic characters and socioeconomic records were retrieved and analyzed. **Results:** In our study also a lower socioeconomic status, illiteracy have been significantly associated with the HCV-positive group, thus emphasizing the role of education so as to impart education to the masses as regard to mode of transmission and its effects on the disease. Higher age of conceiving is also significant associated with the increased maternal risk. **Conclusions:** The more involvement of health care officials and even persons not related to health care set up is required who can educate masses so as to protect the community.

**Keywords:** HCV, North India, perinatal transmission, prevalence, sociodemographic characters

## Introduction

Hepatitis C virus (HCV) infection is most common chronic blood-borne disease worldwide. It was recognized as a major global public health problem after 1989 infecting nearly 170 million people (3% of world's population).<sup>[1]</sup>

Pregnant females constitute the most important sect of population of any country and should be screened for all the preventable and non-preventable diseases having implications

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on maternal and child wellbeing. One of such disease is HCV infection which can cause many chronic diseases like chronic active hepatitis, cirrhosis, and hepatocellular carcinoma. HCV has been recognized as a major cause of parenterally transmitted non-A non-B hepatitis.<sup>[2]</sup>

With the start of effective screening of blood for HCV, vertical transmission of virus from an infected mother has become the predominant mode of HCV infection in children.<sup>[3]</sup> Estimate of mother to child vertical transmission ranges from 3 to 10%.<sup>[4]</sup> A prevalence of 0.1--2.4% of anti-HCV antibody is found in pregnant women and it is higher in some endemic regions.<sup>[5]</sup>

About, 60--70% women with anti-HCV antibody have active infection along with viremia. Presence of active HCV infection

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during pregnancy is known to cause cholestasis of pregnancy and an increased risk of mother-to-child transmission of the virus.<sup>[6]</sup>

Screening of pregnant women for presence of HCV infection is of utmost concern because of the health implications involved (long term and short term) for mother as well as potential adverse effects on pregnancy outcome. Last but not least, there occurs an increase in probability of transmission of virus to the infants of women having active infection. Certain risk factors for mother to child transmission of HCV are similar to those for human immunodeficiency virus (HIV), however, unlike HIV, effective methods for preventing vertical transmission of virus to newborn have not been developed. Developing countries have reported a high incidence of HCV infections and this might be because of partial adherence to known universal precautions and control methods.<sup>[7-9]</sup>

There have been many constraints as to prevent HCV across various geographical regions like low coverage of interventions among the target population, inadequate policies in order to decrease the risk of transmission, and barriers to access to treatment of various economic strata which hamper the working, thus making HCV elimination challenging.<sup>[10,11]</sup> In a developing country like India, routine screening of HCV in pregnancy is not available for all the pregnant women as compared to HIV screening which is possible with help of NACO. New cases usually present late in pregnancy when they suffer from acute hepatitis, intense itching because of raised bilirubin, and some other nonspecific symptoms.

The reported prevalence of HCV in general population of North India is high and there is little information on mother to child transmission of HCV in this region. HCV positive mother can act as a reservoir of HCV infection and can transmit this virus to her infant.

The present study was conducted to determine prevalence of HCV, Hepatitis B virus (HBV), and HIV in pregnant females presenting to gynecology and obstetrics department of our tertiary care centre as well as we studied and compared the sociodemographic characters by dividing them into two groups as HCV seropositive and HCV seronegative. These females are representative of majority of population of Malwa region of Punjab where the HCV prevalence is high.

There have been very few studies done till date to study the clinical, epidemiological, and demographic characters of pregnant females who were HCV positive. Various factors like literacy status, geographical distribution, socioeconomic class, time of presentation, etc., also have a major role in transmission of virus to mother. IEC has always played a big role to prevent spreading of various diseases. For a better understanding of mother to child transmission of HCV, sociodemographic characters are must to study, hence we made an approach to study these factors.

## Inclusion criteria

1. All HIV and HBsAg negative females.
2. Females presenting in any trimester of pregnancy
3. Those willing to participate in our study.

## Exclusion criteria

1. All HIV seropositive pregnant females
2. All HBsAg positive females
3. All non-pregnant females.
4. Females reluctant to participate in the study.

## Material and Methods

This was a prospective study carried out in Department of Microbiology and Obstetrics and Gynecology of Guru Gobind Singh Medical College and Hospital. Patient enrolment was done from OPD and IPD cases attending Gynecology and Obstetrics Department. Particulars of patient (sociodemographic characters), relevant clinical history, and results of investigations were recorded. Written consent was obtained from all females. Serum samples were collected from all the pregnant females and tested for Antibodies against Human Immunodeficiency Virus 1 and 2 (Microlisa-HIV ELISA- J Mitra and co. Pvt ltd.), Hepatitis B surface Antigen (SD HBsAg ELISA 3.0-SD biostandard diagnostics Pvt. Ltd.), and Antibodies against Hepatitis C Virus by using a third generation ELISA (HCV ELISA- J Mitra and Co. Pvt ltd).

The pregnant females found positive for anti-HIV antibodies or HBsAg or both were excluded and the rest of asymptomatic pregnant females were enrolled in the study.

Thus, a total of 717 (including 35 HCV seropositive) pregnant females presenting between February 2014 and December 2014 were studied.

Informed consent was taken in written from each pregnant woman before enrolment in the study. The study participants' anonymity was maintained throughout the study. The ethical clearance was duly obtained from the Institute's Ethical Committee vide no. BFUHS/2K14/P-Th/8901 dated 18/9/2014.

## Statistical analysis

GraphPad, a statistical software provided by GraphPad Software Inc., USA was used for statistical analysis. For all variables, data was presented as percentages. Fisher's exact test was applied for analysis of categorical variables. A *P* value of <0.05 was considered to be statistically significant.

## Results

During the period of the study, 729 pregnant females attended the Gynecology and Obstetrics department of our tertiary care hospital. The prevalence of HIV came out to be 0.96%, 0.69% of Hepatitis B and Hepatitis C as 4.80%. Out of total of 35

HCV seropositive pregnant females, less than half (48.57%) had viremia (HCV RNA), while 51.43% were negative for HCV RNA. Thus, the prevalence of HCV viremia in HCV-antibody positive pregnant females was 48.57% (95% CI, 31.38--66.01). HIV seronegative population with non-A and non-B hepatitis was included in the study. Out of 717 (729-12) HIV seronegative pregnant females, 35 were found to be positive for antibodies against HCV. Two groups anti-HCV positive ( $n = 35$ ) and Anti-HCV ( $n = 682$ ) negative were compared according to various parameters. The mean age of presentation was almost same in the two groups. One female from anti-HCV positive group was greater than 40 years of age and this association was found to be significant ( $P = 0.0488$ ). In both the groups, rural population contributed to major chunk as compared to urban but the disease had no significant association to the parameter studied. In HCV positive group, the number of illiterate women (51.43%) were far higher as compared to literate and only 4.25% women contributed to illiterate population in HCV negative group ( $P = 0.0001$ ). Secondary and higher secondary group constituted majority of pregnant women in HCV negative group and this association was found to be significant ( $P = 0.0001$ ) as compared to HCV positive group. 3/35 pregnant women were postgraduate ( $P = 0.0033$ ) and one was involved in healthcare as compared to 4 in non-HCV group. A large percentage (77.14%) of HCV positive pregnant females in our study were housewives and only 22.86% were professionals ( $P < 0.0001$ ). Nearly 60% of females of both groups belonged to lower class group. Time of presentation ( $P < 0.0001$ ) was a significant factor as 28 of 35 (80%) HCV seropositive pregnant females in our study presented in the third trimester of pregnancy, whereas 31.4% females presented in third trimester from HCV seronegative group ( $P < 0.0001$ ). Of the 35 HCV seropositive pregnant females of the present study, majority (62.86%) were primigravida as compared to only 53.9% primigravid females in the other group ( $P$  value  $> 0.299$ ).

## Discussion

Hepatitis C virus infection occurs throughout the world and is the most frequent cause of chronic hepatic disease.<sup>[12]</sup> Since pregnant females are major source of virus transmission to their offspring's, thus, it is important to study the prevalence of HCV infection in pregnant females. The incidence of HCV infection in pregnant females varies markedly from country to country and between the different regions within a single country. Worldwide literature on HCV prevalence in pregnant women has increased considerably over the past decade, but literature is scarce in regard to HCV infection in pregnant women in India. Generally, HCV prevalence is lower among pregnant women as compared to the general population.<sup>[13,14]</sup> However, our study has showed a higher prevalence of anti-HCV in pregnant females (4.8%) as compared to general population as found in study by Sood *et al.* in 2018 in which prevalence of HCV was found to be 3.6%.<sup>[15]</sup> This could be attributed to geographical variation, relatively smaller sample size, and adequacy and efficacy of the laboratory tests employed. After assessing the pregnant females, various sociodemographic factors

were studied to access the ones probably involved in increasing the risk for acquiring the infection. Majority of females presenting to our center were in the age group of 21--30 years. Age is a known risk factor for HCV infection because of the long period of viral exposure during lifetime. In our study, one pregnant female from HCV positive group was more than 40 years of age and this association was found to be statistically significant among pregnant women. This finding was also reported in a population survey done in US in which HCV infection peaked after 40 years of age.<sup>[16]</sup> Similar findings were also seen in a study done in Brazil by Costa *et al.*<sup>[17]</sup> Nearly 60% of females from both the groups were from a rural background. However, Dagnev *et al.* reported a higher HCV prevalence among young pregnant females giving an explanation that young females are more active sexually and probability of having sexual exposure is more as compared to older age mothers.<sup>[18]</sup> There was predominance of rural population in our study which corroborates the findings from Egypt and Punjab but different from that of New Delhi hospital in which the study population was totally urban.<sup>[19,20]</sup> However, Dagnev *et al.* from Ethiopia reported 79.9% pregnant women from urban background which was not correlating with our study.<sup>[18]</sup> This might be explained because of the changing trends because of sociodemographic and epidemiological factors.

In our study, only 6% pregnant females were illiterate and majority (69.18%) had completed their education upto higher secondary level. In a study done by Sood *et al.* the highest number of HCV positive individuals had studied till middle/higher secondary level.<sup>[15]</sup> Parthiban *et al.* from South India reported higher percentage of (13%) illiterate women in their study.<sup>[21]</sup> The higher percentage of pregnant females studies till secondary/higher secondary level and the association was found to be statistically significant with  $P$  value 0.0001, thus showing that anti-HCV prevalence decreases with increasing educational attainment.<sup>[21]</sup> Dagnev *et al.* also concluded that a low educational background (OR = 5; 95% CI, 1.7--14.8) was a significant predictor of transmission of HCV infection.<sup>[18]</sup> More than 95% pregnant females in the present study were housewives [Table 1] and almost 2/3<sup>rd</sup> (62.2%) of them belonged to lower class of socioeconomic status [Table 1], which is similar to the findings of Parthiban *et al.* who reported 93% housewives in a study from South India.<sup>[21]</sup> However, in their study, there was much higher percentage of women from lower socioeconomic class (99.2%).<sup>[21]</sup> In our study also majority of HCV positive pregnant women belonged to lower socioeconomic class. Of the 35 HCV seropositive pregnant females of the present study majority (62.86%) were primigravida and 80% presented in third trimester of pregnancy. Ashok *et al.* reported majority (99.1%) of multiparous women in the HCV seropositive pregnant females in their study.<sup>[19]</sup> Another study from Brazil also found a lesser percentage of primigravida positive for HCV.<sup>[13,14]</sup> In the present study, there was a significant difference in the women presenting in third trimester of pregnancy between HCV seropositive ( $n = 35$ ) and HCV seronegative ( $n = 682$ ) group ( $P < 0.0001$ ). In HCV seronegative group, the representation of pregnant women in all three trimesters was almost equal. This could be because HCV

**Table 1: Sociodemographic features compared between HCV seropositive and HCV seronegative pregnant females**

Variables	HCV Positive (n=35)		HCV Negative (n=682)		P
	n	%	n	%	
Age (years)					
≤20	2	5.71	49	7.18	1
21-30	32	91.42	559	81.96	0.177
31-40	0	0	74	10.85	0.0668
>40	1	2.85	0	0	0.0488
Geographical distribution					
Urban	13	37.14	236	34.6	0.8558
Rural	22	62.86	446	65.39	0.8558
Literacy status					
Illiterate	18	51.43	29	4.25	0.0001
Middle	9	25.71	66	9.67	0.0069
Secondary/higher secondary	0	0	496	72	0.0001
Graduate	5	14.29	87	12.7	0.7947
Post graduate	3	8.57	4	0.59	0.0033
Occupational status					
Housewife	27	77.14	679	99.56	<0.0001
Professional	8	22.86	3	0.43	<0.0001
Socioeconomic class					
Upper (I)	1	2.86	0	0	0.0488
Middle class	12	34.28	258	37.94	0.7240
Lower Class	22	62.85	424	62.17	1
Obstetric index					
Primigravida	22	62.86	365	53.51	0.3018
Multigravida	13	37.14	317	46.48	0.3018
Age of gestation					
I <sup>st</sup> Trimester	2	5.71	211	30.93	0.0009
II <sup>nd</sup> Trimester	5	14.29	257	37.68	0.0039
III <sup>rd</sup> Trimester	28	80	214	31.37	<0.0001

seropositive pregnant females from adjoining areas are referred to our hospital for the delivery as ours is the only tertiary care hospital in this region.<sup>[22]</sup>

## Conclusion

From the data obtained from this study, we concluded that in the HIV seronegative asymptomatic pregnant females of our area, HCV infection is quite prevalent (seroprevalence = 4.88%) and most of these females (60%) acquire the infection in early reproductive age (21--25 years). As the infection was found to be significantly associated with lack of education (illiteracy), rural background, profession related, there is an urgent need of health education and awareness of general public especially the pregnant females regarding the risk of HCV infection. Campaigning by trained personnel's should be undertaken to provide information regarding risk perception of HCV to medical practitioners, unqualified people doing dental procedures and targeted groups like ear/nose piercing professionals, tattoo engravers. Emphasis should also be laid on strict implementation of infection control practices in health care settings. Curbing the spread of HCV in women, and most importantly during pregnancy, is of utmost

importance and of national health concern if we desire to attain WHO's objective of HCV elimination by the year 2030.<sup>[23]</sup> To bring down the rate of infection and screen the population WHO recommends that in settings with high HCV antibody seroprevalence in the general population (defined as  $\geq 2\%$  or  $\geq 5\%$  HCV antibody seroprevalence), all adults should have access to and be offered HCV testing with linkage to prevention, care and treatment services.<sup>[24]</sup>

## Key points

1. Hepatitis C virus (HCV) infection is high in state of Punjab.
2. Vertical transmission of HCV can be one of the major route of transmission of this virus to the neonate.
3. Sociodemographic factors like age, literacy, socioeconomic status, occupational status, are associated with the disease causation and transmission.
4. Due to the routine screening of blood and blood products perinatal transmission has been recognized as a main route of HCV transmission.
5. Since pregnant females form major source of HCV transmission to their offspring's it is important to study the prevalence of HCV infection in pregnant females.
6. The study has inferred a higher prevalence of anti-HCV in pregnant females (4.8%) as compared to general population.
7. Geographical variation has been responsible for a higher prevalence as this belt has many reported cases of HCV.
8. Age is a known risk factor for HCV infection because of the long period of viral exposure during lifetime.
9. Rural background illiteracy and low socioeconomic status has been seen among the females under study thus implicating role of these factors in transmission and infection.
10. Late presentation was also associated thus there is immense need to make the masses aware of getting mother child health services at the start of pregnancy.

## Declaration of patient consent

This study is a part of thesis and consent was taken that time only.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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