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**Research Article**

# Prevalence of anti-hepatitis C virus antibodies among indoor patients and blood donors attending a tertiary care hospital in North India

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## ABSTRACT

**Background:** Hepatitis C virus (HCV) causes acute as well as chronic hepatitis such as cirrhosis of liver and hepatocellular carcinoma. The virus is mainly transmitted through blood and blood products. Hence, in order to provide safe blood supply testing of each blood unit for markers of HCV has been made mandatory. The infection is detected by the presence of anti-HCV antibody in the patient's serum. The objective of the present study was to determine the prevalence of anti-HCV antibodies among indoor patients and blood donors.
**Methods:** A hospital based cross-sectional study was done from January to June 2016. A total of 1991 subjects comprising of 1649 indoor patients and 342 blood donors were included in the study whose blood samples were screened for presence of anti-Hepatitis C antibody using rapid HCV TRI-DOT and HCV Microlisa.
**Results:** Out of 1649 indoor patients tested, 39 were found to be reactive, and out of 342 blood donors tested, 4 were found to be reactive, hence, the prevalence of anti-HCV antibody was found to be 2.4% among indoor patients and 1.2% among blood donors. The seroprevalence of anti-HCV antibody was found to be more among replacement donors (1.2%) as compared to voluntary donors (1.1%).
**Conclusions:** As blood transfusion is an important mode of transmission of HCV, hence, prevention in the form of proper screening of every unit of blood prior to transfusion is mandatory. As voluntary donors are relatively safe, this should be encouraged by organizing frequent blood donation camps.

**Keywords:** Anti-HCV antibody, Prevalence, HCV TRI-DOT, HCV Microlisa, Patients, Blood donors

## INTRODUCTION

Hepatitis C virus (HCV) is mainly transmitted through exposure to infected blood and blood products which may be due to blood transfusion, organ transplantation, injectable drug abuse, tattooing and body piercing, haemodialysis, accidental occupational exposure, perinatally to infants from infected mothers and those having high risk sexual behaviour.[1] Acute HCV infection is usually silent and around 15% of acutely infected patients spontaneously clear the infection.[2] Chronic hepatitis C is a ubiquitous disease affecting around 170 million people worldwide with 3 to 4 million persons newly infected each year.[3]

Hepatitis C virus infection is detected by the presence of anti-Hepatitis C virus antibody (anti-HCV antibody). This antibody is seen in more than 95% of chronic infections and in only 40% of acute infections. In India, anti-HCV antibodies are seen in around 15 million people with a prevalence rate of 2%.[4,5] Blood transfusion is an important life saving measure and an integral part of

medical and surgical therapy, however, in the absence of proper screening it may lead to transfusion transmissible infections (TTIs).[1] With every unit of blood there is 1% chance of transfusion associated problems including TTIs.[6]

Amongst the viral hepatitis strains, Hepatitis C virus (HCV) is most dangerous etiological agent of transfusion-associated hepatitis as its morbidity rate is quite high with around 85% of the acutely infected patients progressing to chronic infection such as liver cirrhosis and hepatocellular carcinoma.[7,8]

Blood transfusion is an effective mode of transmission of HCV infection as it allows a large quantum of infective virions into the susceptible patient.[3] It has been shown to be responsible for up to 90 percent of cases, previously known as Non A Non B (NANB) transfusion-related hepatitis.[9] The global seroprevalence of HCV among blood donors varies from 0.4 to 19.2 % and the estimated risk for HCV transmission is between 0.10 to 2.33 per million units transfused.[10,11] Hence, in order to provide safe blood supply testing of blood for markers of HCV was made mandatory in India since June 2001.[12] Enzyme linked immunosorbent assay (ELISA) is the most commonly used initial assay for detecting anti-Hepatitis C virus antibodies.[13]

To understand and assess the magnitude and dynamics of transmission of a disease in a community and for its control and prevention, the assessment of its prevalence is very important.[14] Keeping the above facts in mind, the present study was done to evaluate the seroprevalence of anti-Hepatitis C virus antibodies among indoor patients and blood donors attending blood bank of our tertiary care hospital and to compare the prevalence of anti-HCV antibodies among voluntary and replacement blood donors.

## METHODS

A hospital based cross sectional study was done over a period of 6 months from January to June 2016, among indoor patients and blood donors attending a tertiary care hospital of North India, to determine the prevalence of anti-HCV antibodies among them. The study was approved by Institutional Ethical Committee. An informed consent was taken from all indoor patients and blood donors included in the study prior to sample collection. Donors were screened for physical examination by the trained medical staff. A pre-designed questionnaire was used to get the information regarding the demographic profile (age, sex, socio-economic status, educational status, occupation and residence) of the patients and blood donors included in the study.

### *Inclusion criteria*

Indoor patients of all age group and both sexes who were admitted in various wards of this hospital and were advised to undergo anti-HCV antibody screening either as part of routine pre-operative screening or for diagnostic purposes and both voluntary and replacement blood donors who were apparently healthy persons and qualified the donation criteria (age 18 to 60 years and having body weight more than 45 kg) and were advised to be screened for anti-HCV antibody prior to transfusion were included in the study.

### *Exclusion criteria*

Patients whose blood sample was not requested for screening for anti-HCV antibody and blood donors as well as patients who refused to give consent were excluded from the study.

### *Study subjects*

A total of 1991 subjects were included in the present study comprising of 1649 indoor patients and 342 blood donors whose blood samples were screened for presence of anti-Hepatitis C antibody.

### *Methods*

Under aseptic precautions from each indoor patient and apparently healthy blood donor around 3 ml of venous blood was withdrawn in a well labelled plain vaccutainer tube. The blood was allowed to clot followed by centrifugation of the tube at 3000 rpm for 15 min to separate serum.

The sera was screened for anti-HCV antibodies by using rapid qualitative in vitro diagnostic 4$^{th}$ generation HCV TRI-DOT test kits (J. Mitra & Company Private Limited, India) and 3$^{rd}$ generation HCV Microlisa (enzyme linked immunosorbent assay (ELISA) method, manufactured by J. Mitra & Company Private Limited, India). The HCV TRI-DOT test device is composed of immunofiltration membrane. The kit is designed with a unique combination of modified HCV antigens from core (structural) and 3 non-structural (NS) regions of the virus (NS3, NS4 & NS5) in the form of two test dots "$T_1$" and "$T_2$" to selectively identify anti-HCV antibodies in human serum or plasma with high degree of sensitivity and specificity.

The test was performed according to manufacturer's instruction and the results were read immediately. In a reactive sample pinkish purple dot against a white background appears at the test region ("$T_1$" &/or "$T_2$") in addition to control "C" region, whereas, in a non-reactive sample pinkish purple dot appears only at control "C" region.

The HCV Microlisa is based on detection of host generated antibodies (anti-HCV antibody) to viral proteins (Core E1, E2 and Non-Structural NS3, NS4 and NS5 antigens) coated into the microwells. The test was done according to manufacturer's instruction, 100 µl

negative control, 100 µl positive control, 100 µl sample diluent and 10 µl samples were added in the respective wells, plate was then covered and incubated in an incubator at 37ºC±2ºC for 30 minutes followed by washing with working wash solution. Then 100 µl working conjugate was added in each well. The plate was again covered and incubated in an incubator at 37ºC±2ºC for 30 minutes.

The plate was then washed with working wash solution followed by the addition of 100 µl working substrate solution in all the wells. The plate was then covered and incubated at room temperature (20-30ºC) for 30 minutes in dark. Finally 100 µl stop solution was added to each well and the absorbance was read at 450 nm in an ELISA reader. The Cut-off value was calculated by formula: mean absorbance of Positive control (PC) × 0.23. All anti-HCV antibody positive blood units were discarded.

***Statistical analysis***

The collected data was transferred to a computer. The SPSS Data Editor Software version 20 was used for analysis of the data. Chi-square test was performed and p value ≤0.05 were considered statistically significant.

## RESULTS

Out of 1991 subjects included in the study, 1649 were indoor patients and 342 were apparently healthy blood donors. Amongst indoor patients their mean age was 35.7 (±16.8) years and it ranged from 0-91 years, with 775 (47.0%) males and 874 (53.0%) females. The socio-demographic profiles of the indoor patients included in our study and their relation to anti-HCV antibody reactivity is shown in Tables 1-4. Out of 1649 indoor patients tested, 39 were found to be reactive, hence the prevalence of anti-HCV antibody was found to be 2.4%. As shown in Table 1, most of the anti-HCV antibody reactive indoor patients belonged to age group 20-39 years (3.5%), followed by 40-59 years (1.7%). This finding was found to be statistically significant (p=0.045). The anti-HCV antibody reactivity was more frequently found in males (3.4%) as compared to females (1.5%). This difference was found to be statistically significant (p=0.013). Most of the anti-HCV antibody reactive patients were found to be unmarried (5.2%) as compared to married patients (2.2%). This difference was found to be statistically significant (P=0.042). As shown in Table 2, anti-HCV antibody reactivity was found most frequently amongst illiterate patients and those who were having education only up to pre-primary school (3.6% and 3.3% respectively).

This finding was found to be statistically significant (p=0.046). Tables 3 showed that majority of reactive patients were unskilled workers (6.6%) by profession, followed by those who were unemployed (4.5%). This finding was found to be highly statistically significant (p=0.002). Table 4 showed that most of the anti-HCV antibody reactive patients came from rural areas (3.1%) as compared to urban areas (1.3%), and majority of the seropositive patients belonged to lower class socio-economically (3.3%). Both these findings were found to be statistically significant (p=0.020 & p=0.027 respectively). Table 5 showed that maximum reactivity was found among patients referred from TB & Chest ward (4.8%) followed by Medicine ward (4.3%). However this finding was statistically insignificant (p=0.151).A total of 342 apparently healthy blood donors with 87 (25.4%) voluntary (VD) and 255 (74.6%) replacement donors (RD) with mean age 27.9 (±7.3) years ranging from 18 to 56 years were screened for presence of anti-HCV antibodies.

**Table 1: Age group, sex and marital status of indoor patients and their relation with anti-HCV antibody test reactivity (N = 1649).**

| Characteristics | | Anti-HCV antibody test | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|---|
| | | Reactive N = 39 (2.4%) | Non-Reactive N = 1610 (97.6%) | Total N = 1649 (100%) | |
| Age group | 0-19 years | 3 (1.4%) | 219 (98.6%) | 222 (100%) | $\chi^2$ = 9.757 df = 4 p = 0.045 |
| | 20-39 years | 28 (3.5%) | 769 (96.5%) | 797 (100%) | |
| | 40-59 years | 7 (1.7%) | 407 (98.3%) | 414 (100%) | |
| | 60-79 years | 1 (0.5%) | 195 (99.5%) | 196 (100%) | |
| | 80-99 years | 0 (0.0%) | 20 (100%) | 20 (100%) | |
| Sex | Male | 26 (3.4%) | 749 (96.6%) | 775 (100%) | $\chi^2$ = 6.203 df = 1 p = 0.013 |
| | Female | 13 (1.5%) | 861 (98.5%) | 874 (100%) | |
| Marital status | Married | 29 (2.2%) | 1303 (97.8%) | 1332 (100%) | $\chi^2$ = 6.349 df = 2 p = 0.042 |
| | Unmarried | 8 (5.2%) | 147 (94.8%) | 155 (100%) | |
| | # Not applicable | 2 (1.2%) | 160 (98.8%) | 162 (100%) | |

*p<0.05 was considered as statistically significant. df = degree of freedom. N = Number of patients. # Patients with age < 18 years have been assigned as Not Applicable for the category of marital status.

**Table 2: Educational status of indoor patients and their relation with anti-HCV antibody test reactivity (N = 1649).**

| Educational status | Anti-HCV antibody test | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|
| | Reactive N (%) | Non-reactive N (%) | Total N (%) | |
| Graduate and above | 0 (0.0%) | 28 (100%) | 28 (100%) | |
| High school | 5 (1.2%) | 423 (98.8%) | 428 (100%) | |
| Primary | 3 (1.1%) | 281 (98.9%) | 284 (100%) | $\chi^2 = 11.286$ |
| Pre-Primary | 4 (3.3%) | 118 (96.7%) | 122 (100%) | df = 5 |
| Illiterate | 27 (3.6%) | 731 (96.4%) | 758 (100%) | p = 0.046 |
| # Not applicable | 0 (0.0%) | 29 (100%) | 29 (100%) | |
| Total | 39 (2.4%) | 1610 (97.6%) | 1649 (100%) | |

*p<0.05 was considered as statistically significant. df = degree of freedom. N = Number of patients. # Patients with age < 7 years have been assigned as not applicable for the category of Educational status.

**Table 3: Occupational profiles of indoor patients and their relation with anti-HCV antibody test reactivity (N = 1649).**

| Occupational status | Anti-HCV antibody test | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|
| | Reactive N (%) | Non-Reactive N (%) | Total N (%) | |
| Professionals | 0 (0.0%) | 13 (100%) | 13 (100%) | |
| Skilled workers | 3 (3.1%) | 94 (96.9%) | 97 (100%) | |
| Semi-skilled workers | 13 (3.5%) | 358 (96.5%) | 371 (100%) | |
| Unskilled workers | 11 (6.6%) | 156 (93.4%) | 167 (100%) | $\chi^2 = 22.897$ |
| Unemployed | 1 (4.5%) | 21 (95.5%) | 22 (100%) | df = 7 |
| Student | 2 (1.1%) | 180 (98.9%) | 182 (100%) | p = 0.002 |
| Housewife | 9 (1.2%) | 722 (98.8%) | 731 (100%) | |
| # Not applicable | 0 (0.0%) | 66 (100%) | 66 (100%) | |
| Total | 39 (2.4%) | 1610 (97.6%) | 1649 (100%) | |

*p<0.05 was considered as statistically significant. df = degree of freedom. N = Number of patients. # Patients with age <18 years have been assigned as not applicable for the category of Occupational status. Those studying have been assigned in the student category.

**Table 4: Residence and socio-economic status of indoor patients and their relation with anti-HCV antibody test reactivity (N = 1649).**

| Characteristics | | Anti-HCV antibody test | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|---|
| | | Reactive N = 39 (2.4%) | Non-Reactive N = 1610 (97.6%) | Total N = 1649 (100%) | |
| Residence | Rural | 30 (3.1%) | 939 (96.9%) | 969 (100%) | $\chi^2 = 5.436$ |
| | Urban | 9 (1.3%) | 671 (98.7%) | 680 (100%) | df = 1 |
| | | | | | p = 0.020 |
| Socio-economic status | Upper Class | 1 (1.1%) | 88 (98.9%) | 89 (100%) | $\chi^2 = 7.206$ |
| | Middle Class | 9 (1.3%) | 674 (98.7%) | 683 (100%) | df = 2 |
| | Lower Class | 29 (3.3%) | 848 (96.7%) | 877 (100%) | p = 0.027 |

*p < 0.05 was considered as statistically significant. df = degree of freedom. N = Number of patients.

Out of 342 donors, 336 (98.2%) were males and 6 (1.8%) were females. The socio-demographic profile of the donors is shown in Tables 6-8. Table 6 showed that maximum donors belonged to younger age group 18-29 years (30.7% VD and 69.3% RD), followed by 30-39 years (19.4% VD and 80.6% RD). This finding was statistically significant (p = 0.018). All the VD were males, whereas, all the females were RD. This finding was statistically insignificant (p = 0.149). Majority of VD were unmarried (35.0%), whereas, RD were mostly married people (81.4%). This difference was highly statistically significant (p = 0.001). As shown in Table 7, majority of VD were highly educated (65.5% were graduate and above), whereas, most of the RD were less educated (100% of illiterate donors and 84.6% of donors educated up to primary school were RD). Most of the VD belonged to upper class (83.9%) as compared to RD who mostly belonged to lower and middle class (100% and 71.0% respectively). Both these findings were highly statistically significant (p<0.001). As shown in Table 8, most of the VD belonged to urban areas (35.5%) as compared to RD who mostly belonged to rural areas (80.3%). Most of the VD were students followed by professionals (81.8% and 57.9% respectively), whereas,

most of the RD were unskilled workers and housewife (100% each). Both the findings were found to be highly significant (p = 0.001 and p < 0.001 respectively). Out of 342 blood donors tested, 4 were found to be reactive, hence the prevalence of anti-HCV antibody was found to be 1.2%. As shown in Table 9, the relationship of blood group of donors and seropositivity was not found to be statistically significant (p = 0.995). Tables 10 showed that majority of seropositives were replacement donors (1.2%) as compared to voluntary donors (1.1%). However, this difference was found to be statistically insignificant (p = 0.984).

**Table 5: Distribution of indoor patients according to their wards and their relation with anti-HCV antibody test reactivity (N = 1649).**

| Wards | Anti-HCV antibody test | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|
| | Reactive N (%) | Non-Reactive N (%) | Total N (%) | |
| Casualty | 4 (2.8%) | 141 (97.2%) | 145 (100%) | $\chi^2$ = 10.720<br>df = 7<br>p = 0.151 |
| ENT | 3 (2.4%) | 123 (97.6%) | 126 (100%) | |
| Medicine | 14 (4.3%) | 310 (95.7%) | 324 (100%) | |
| OBG | 9 (1.8%) | 488 (98.2%) | 497 (100%) | |
| Orthopaedics | 2 (1.5%) | 129 (98.5%) | 131 (100%) | |
| Pediatrics | 2 (3.3%) | 58 (96.7%) | 60 (100%) | |
| Surgery | 3 (0.9%) | 321 (99.1%) | 324 (100%) | |
| TB & Chest | 2 (4.8%) | 40 (95.2%) | 42 (100%) | |
| Total | 39 (2.4%) | 1610 (97.6%) | 1649 (100%) | |

*p<0.05 was considered as statistically significant. df = degree of freedom. N = Number of patients. ENT = Ear, Nose & Throat ward. OBG = Obstetrics & Gynaecology ward.

**Table 6: Distribution of blood donors according to their age group, sex and marital status (N = 342).**

| Characteristics | | Donor status | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|---|
| | | Voluntary N = 87 (25.4%) | Replacement N = 255 (74.6%) | Total N = 342 (100%) | |
| Age group | 18-29 years | 66 (30.7%) | 149 (69.3%) | 215 (100%) | $\chi^2$ = 10.084<br>df = 3<br>p = 0.018 |
| | 30-39 years | 18 (19.4%) | 75 (80.6%) | 93 (100%) | |
| | 40-49 years | 3 (10.0%) | 27 (90.0%) | 30 (100%) | |
| | 50-59 years | 0 (0.0%) | 4 (100%) | 4 (100%) | |
| Sex | Male | 87 (25.9%) | 249 (74.1%) | 336 (100%) | $\chi^2$ = 2.084<br>df = 1<br>p = 0.149 |
| | Female | 0 (0.0%) | 6 (100%) | 6 (100%) | |
| Marital Status | Married | 37 (18.6%) | 162 (81.4%) | 199 (100%) | $\chi^2$ = 11.759<br>df = 1<br>p = 0.001 |
| | Unmarried | 50 (35.0%) | 93 (65.0%) | 143 (100%) | |

* P<0.05 was considered as statistically significant. df = degree of freedom. N = Number of donors.

**Table 7: Distribution of blood donors according to their education and socio-economic status (N = 342).**

| Characteristics | | Donor status | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|---|
| | | Voluntary N = 87 (25.4%) | Replacement N = 255 (74.6%) | Total N = 342 (100%) | |
| Educational status | Graduate and above | 19 (65.5%) | 10 (34.5%) | 29 (100%) | $\chi^2$ = 137.01<br>df = 3<br>p < 0.001 |
| | High School | 54 (62.1%) | 33 (37.9%) | 87 (100%) | |
| | Primary School | 14 (15.4%) | 77 (84.6%) | 91 (100%) | |
| | Illiterate | 0 (0.0%) | 135 (100%) | 135 (100%) | |
| Socio-economic status | Upper Class | 26 (83.9%) | 5 (16.1%) | 31 (100%) | $\chi^2$ = 91.704<br>df = 2<br>p < 0.001 |
| | Middle Class | 61 (29.0%) | 149 (71.0%) | 210 (100%) | |
| | Lower Class | 0 (0.0%) | 101 (100%) | 101 (100%) | |

* p<0.05 was considered as statistically significant. df = degree of freedom. N = Number of donors.

**Table 8: Distribution of blood donors according to their residence and occupational status (N = 342).**

| Characteristics | | Donor status | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|---|
| | | Voluntary N = 87 (25.4%) | Replacement N = 255 (74.6%) | Total N = 342 (100%) | |
| Residence | Rural | 43 (19.7%) | 175 (80.3%) | 218 (100%) | $\chi^2$ = 10.349 df = 1 p = 0.001 |
| | Urban | 44 (35.5%) | 80 (64.5%) | 124 (100%) | |
| Occupational status | Professional | 11 (57.9%) | 8 (42.1%) | 19 (100%) | $\chi^2$ = 99.303 df = 5 p < 0.001 |
| | Skilled worker | 37 (57.8%) | 27 (42.2%) | 64 (100%) | |
| | Semi-skilled worker | 30 (19.5%) | 124 (80.5%) | 154 (100%) | |
| | Unskilled worker | 0 (0.0%) | 91 (100%) | 91 (100%) | |
| | Student | 9 (81.8%) | 2 (18.2%) | 11 (100%) | |
| | House wife | 0 (0.0%) | 3 (100%) | 3 (100%) | |

*p<0.05 was considered as statistically significant. df = degree of freedom. N = Number of donors.

**Table 9: Distribution of blood donors according to their blood group and their relation with anti-HCV antibody test reactivity (N = 342).**

| Blood Groups | Anti-HCV antibody test | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|
| | Reactive N (%) | Non Reactive N (%) | Total N (%) | |
| O +ve | 1 (1.1%) | 90 (98.9%) | 91 (100%) | $\chi^2$ = 0.694 df = 6 p = 0.995 |
| A +ve | 1 (1.4%) | 73 (98.6%) | 74 (100%) | |
| B +ve | 2 (1.5%) | 130 (98.5%) | 132 (100%) | |
| AB +ve | 0 (0.0%) | 35 (100%) | 35 (100%) | |
| O -ve | 0 (0.0%) | 4 (100%) | 4 (100%) | |
| A-ve | 0 (0.0%) | 4 (100%) | 4 (100%) | |
| AB-ve | 0 (0.0%) | 2 (100%) | 2 (100%) | |
| Total | 4 (1.2%) | 338 (98.8%) | 342 (100%) | |

*p<0.05 was considered as statistically significant. df = degree of freedom. N = Number of donors.

**Table 10: Distribution of donors according to their status and their relation with anti-HCV antibody test reactivity (N = 342).**

| Donor Status | Anti-HCV antibody test | | | Chi-Square ($\chi^2$) & *p value |
|---|---|---|---|---|
| | Reactive N (%) | Non reactive N (%) | Total N (%) | |
| Voluntary | 1 (1.1%) | 86 (98.9%) | 87 (100%) | $\chi^2$ = 0.000 df = 1 p = 0.984 |
| Replacement | 3 (1.2%) | 252 (98.8%) | 255 (100%) | |
| Total | 4 (1.2%) | 338 (98.8%) | 342 (100%) | |

*p<0.05 was considered as statistically significant. df = degree of freedom. N = Number of donors.

## DISCUSSION

Hepatitis C infection is spreading fast in India. According to Indian National Association for the study of the Liver, nearly 12.5 million Indians are suffering from hepatitis C disease, with the death rate exceeding one lakh.[15]

Hepatitis C virus (HCV) is an important virus causing acute as well as chronic hepatitis, cirrhosis and hepatocellular carcinoma. This virus is mainly spread by blood and blood products and the infection is detected by presence of anti-HCV antibody in patient's serum. Hence, in order to evaluate the seroprevalence of this hepatitis C infection in our region, both indoor patients (representing the bulk of patients) and blood donors (representing the general population) were screened for presence of anti-HCV antibody. In present study, the prevalence of anti-HCV antibody among indoor patients was found to be 2.4%. This finding is similar to various previous done studies which showed that seroprevalence of HCV among hospital based population varied from 1.57% in Orissa, 1.7% in Rajasthan to 4.8% in Pondicherry.[16-18] In our study, majority of reactive patients were males and illiterate. This is similar to another study which also showed maximum seropositivity among males and illiterate patients.[14] In present study, most of the anti-HCV antibody reactive indoor patients belonged to age group 20-39 years (3.5%), followed by 40-59 years (1.7%). This is similar to another study which also showed maximum

seropositivity among patients of age group 21-30 years (6.1%).[19]

In present study, majority of seropositivity was found among patients belonging to rural areas. This could be due to the fact that the rural poor population is still dependent upon the untrained paramedics for their treatment needs. Also, the sterilization of syringes, needles and minor surgical instruments are often improperly done in rural areas leading to transmission of virus from one person to another.[20]

In present study, 342 blood donors were screened for anti-HCV antibody and the seroprevalence amongst donors was found to be 1.2%. Various studies from northern parts of India have reported HCV seroprevalence ranging from 0.53 to 5.1% in blood donors.[7,21,22] HCV seropositivity in the western part of India has been reported to be 0.28%.[23]

The reported variation in the prevalence of anti-HCV antibodies among blood donors in different regions of India may be attributed to the differences in the literacy rate and level of awareness among the blood donors. Also, prevalence of HCV infection varies from region to region because of local socio-cultural factors, which potentially influence the transmission and prevalence in a specific geographic area. Moreover, the differences in the testing methodology employed and the extent of its regulation may also have been the factors contributing to the observed differences.[24,25]

In our study, more reactives were replacement donors (1.2%) as compared to voluntary donors (1.1%) and all the seropositives were males. This is similar to other studies which also showed higher seropositivity among replacement donors (1.18%) as compared to voluntary donors (0.27%), and more seropositivity among male donors (0.38%) as compared to female donors (0.36%).[1,3]

In present study voluntary donors were found to be more educated and belonged to upper class socio-economically as compared to replacement donors. This is in agreement to previous done study which states that in India, voluntary donors are safer than replacement donors because they are invariably more educated and can better understand the implication of donor questionnaire. Replacement donors on the other hand, give blood under compulsion and thus conceal answers related to their health and sexual habits.[3]

## CONCLUSION

Till date there is no vaccine available against hepatitis C virus, therefore, prevention of infection from this deadly virus could only be achieved by practicing safe blood transfusion by proper screening of every blood unit prior to transfusion and propagating mass education regarding the risky behaviours responsible for the infection and promoting safe life style practices via media and campaigns. Since, voluntary donors are relatively safe as compared to replacement donors, therefore, efforts in the form of voluntary blood donation camps should be made to increase and retain the young motivated voluntary donors to maintain safe blood supply.

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