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*Original Article*

# Seroprevalence of anti HCV antibodies among blood donors in Kathmandu valley, Nepal

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**Abstract**

**Aims and objectives:** To study the seroprevalence of anti HCV antibodies among Nepalese blood donors in relation to their age, sex, type of donation and times of donation.

**Materials and methods:** Descriptive cross-sectional study conducted in Nepal Red Cross Society (NRCS), Central Blood Transfusion Service (CBTS), Kathmandu, from December 1, 2006 to September 1, 2007. A total of 33,255 blood donors were screened for anti HCV antibodies by ELISA. Donor's information was collected from blood donor's record form and statistical analysis was done using the software 'SPSS 11.5' and 'Winpepi ver. 3.8'.

**Result:** The seroprevalence of anti HCV antibodies in blood donors was 0.66% (95% CI= 0.58-0.76). Higher seroprevalence was observed in male donors (0.7%, 95% CI= 0.6-0.8) than in female donors (0.4%, 95% CI= 0.2-0.6) ($P < 0.05$). The seroprevalence was highest (0.82%) in the age group of 21-30 years and there was significantly decreasing trends in seroprevalence with increasing age ($P < 0.05$). The highest seroprevalence among the male donors (0.88%) was also observed in the age group of 21-30 years ($P < 0.001$). Among female donors the seroprevalence (0.47 %) was highest in age group 41-50 years ($P > 0.05$). The seroprevalence of anti HCV was significantly higher in volunteer donors (0.7%) than in replacement donors (0.4%) ($P < 0.05$). Similar seroprevalence of anti HCV was observed in first time (0.65%) and repeat blood donors (0.67%) ($P > 0.05$).

**Conclusion:** The seroprevalence of anti HCV antibodies among blood donors in this study was similar to the seroprevalence reported for general population by other studies. Similar seroprevalence in first time and repeat blood donors as well as higher seroprevalence in volunteer donors than in replacement donors are the potential threats to safe blood supply, which urges the need of more effective donor education and counselling of blood donors.

**Key words**: Seroprevalence, Anti HCV antibodies, Blood donors, Kathmandu valley, Nepal.

Hepatitis C is an acute or chronic necroinflammatory disease of the liver, due to infection with hepatitis C virus (HCV)[1]. It continues to be a major disease burden in the world. In 1997, World Health Organization (WHO) estimated a worldwide prevalence of about 3% with the virus affecting 170 million people worldwide and three to four million new infections each year [2]. Among the viral hepatitis, HCV is dreadful in the aspect that its morbidity rate is high as it establishes a state of chronic infection in as many as 85% of acutely infected patients whereas about 15% of acutely infected patients spontaneously clear the infection[3, 4].

In Nepal seroprevalence of anti HCV antibodies among general population and blood donors has been reported ranging from 0.3-1.7%[5, 6, 7, 8, 9, 10]. Among intravenous drug users, Shrestha et al.[7] have reported a HCV infection rate of 94%. According to a more recent study, the seropositivity rate of HCV for healthy adult controls has been estimated to be 0.75% against the 85.5% seroprevalence rate among injecting drug users from Kathmandu[9].

The major clinical manifestation of chronic hepatitis C is progressive hepatic fibrosis, which leads to cirrhosis and increased risk of hepatocellular carcinoma[1]. The probability of cirrhosis occurring in 10-20 years after infection ranges from 5-25%[11] and probability of hepatocellular carcinoma after 20-30 years ranges from 0.7-1.3% of the cases[12].

The major risk factors for transmission of HCV are intravenous drug abuse, blood transfusion, sexual activity and hemodialysis[13]. It has been reported that

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more than 90% of seronegative recipients who are transfused with blood from HCV antibodies positive donors undergo seroconversion[14]. Thus, there is a high prevalence of HCV infection in multiple transfused thallassemic and hemophilic patients[15,16]. With the introduction of EIA (Enzyme Immunoassay) tests, the risk of transfusion transmitted hepatitis C has been substantially reduced[17]. Transmission may still occur rarely from donors with recent infections who have not developed detectable antibodies [18].

**Materials and methods**

This was a descriptive cross sectional study conducted in Central Blood Transfusion Service (CBTS), Nepal Red Cross Society, Exhibition Road, Kathmandu, over a period of nine months (December 1, 2006 to September 1, 2007).

All blood donors, donating blood in Central Blood Transfusion Service or in mobile camps organized in Kathmandu valley were considered as study population. A total of 33,255 blood donors were included in present study. All individuals coming for blood donation were examined for blood pressure, pulse, hemoglobin, minimum weight, past history of jaundice and other general health check up. Individuals satisfying the blood donation eligibility criteria were selected for blood donation.

Volunteer donors were defined as non-remunerative donors donating blood voluntarily. Replacement donors were non remunerative donors who donated blood for particular patients admitted in hospital in replacement.

Donors who have made a recorded donation (by blood donor card/Register) or who described themselves as repeat donors were defined as repeat donors. Donors who donated blood for the first time in their life were defined as first time donors.

All the blood donors included in the study were assured that confidentiality would be strictly maintained for the test results as per guidelines of NRCS, CBTS.

Blood samples were collected by medical professionals (Laboratory technicians and nurses) using aseptic technique. Before collection of sample each donor was requested to fill the donor form.

Blood was drawn with the help of sterile blood bag needle into the blood bag labeled with sample number. At the end, about 5 ml of blood was transferred through the blood bag tubing into a test tube labeled with corresponding sample number. Serum was separated in laboratory by centrifugation and used for testing the presence of anti HCV antibodies.

A total of 33,255 blood donors were tested for detection of anti HCV antibodies by third generation Enzyme linked Immunosorbent Assay (ELISA) ( Genedia HCV ELISA 3.0, Green Cross Corporation, Kyunggi-do, Korea) in an automated ELISA processor (Behring ELISA Processor III, Dade Behring, Marbug, Germany). An initial reactive test result was retested in another rapid anti HCV spot test (HCV TRI-DOT, J. Mitra and Co. Pvt. Ltd, New Delhi, India). Repeatedly reactive result was considered seropositive for anti HCV antibodies.

The data was entered in Microsoft excel spreadsheet collecting the information from blood donor's record form and was analyzed by the statistical software "SPSS version 11.5". 'Chi –square' test was used for testing the significance. Cochran-armitage chi-square test for trends was done for testing the significance of trends by using the statistical software ''Winpepi ver. 3.8''.

**Results**

The seroprevalence of anti HCV antibodies was observed to be 0.66% (95% CI= 0.58-0.76). Higher seroprevalence rate was observed among male donors (0.7%, 95% CI= 0.6-0.8) than among female donors (0.4%, 95% CI = 0.2-0.6) ($P < 0.05$). The overall age wise trend analysis showed that there was a significantly decreasing trend in HCV seroprevalence with increasing age ($P < 0.05$). Seroprevalence was found to be highest (0.82 %) in the age group of 21-30 years. When stratification was done, the age wise HCV seroprevalence was significantly decreasing with increasing age in male blood donors only but not in female blood donors. Among male donors, seroprevalence of HCV was found to be highest (0.88 %) in age group of 21-30 years ($P < 0.001$). In female donors, the seroprevalence was highest (0.47%) in age group of 41-50 years ($P > 0.05$) (Figure 1). Higher seroprevalence was observed in volunteer donors (0.7%) than in replacement donors (0.4%) ($P < 0.05$). The seroprevalence was almost similar in first time (0.65%) and in repeat donors (0.67%) ($P > 0.05$) (Table 1).

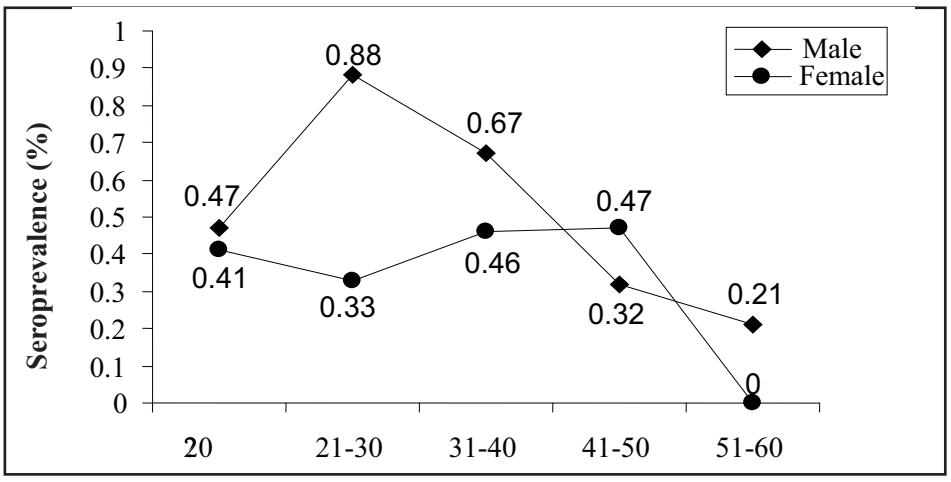


**Fig 1:** Age wise trends in seroprevalence of anti HCV antibodies among male and female blood donors.

**Table 1:** Seroprevalence of anti HCV antibodies in blood donors according to sex, age, times of donation and type of donation.

| Blood donors | Total (no) | No. of Seropositive | Seroprevalence (%) | P- value |
|---|---|---|---|---|
| **Total** | 33,255 | 221 | 0.66 | |
| **Sex** | | | | |
| **Male** | 28,989 | 204 | 0.7 | < 0.05 |
| **Female** | 4,266 | 17 | 0.4 | |
| **Age** | | | | |
| **≤20** | 5,434 | 25 | 0.46 | |
| **21-30** | 15,704 | 129 | 0.82 | |
| **31-40** | 8,455 | 55 | 0.65 | P for trends, |
| **41-50** | 3,161 | 11 | 0.34 | < 0.05 |
| **51-60** | 501 | 1 | 0.19 | |
| **Times of donation** | | | | |
| **First time** | 16,476 | 108 | 0.65 | > 0.05 |
| **Repeated** | 16, 779 | 113 | 0.67 | |
| **Type of donation** | | | | |
| **Volunteer** | 29,552 | 206 | 0.7 | < 0.05 |
| **Replacement** | 3,703 | 15 | 0.4 | |

**Discussion**

Present study revealed that the anti HCV seroprevalence in blood donors was 0.66%. The seroprevalence observed was in accordance with the study conducted by Shrestha SM et al[7], in which a seroprevalence of 0.6% was observed among the general population. Shrestha IL [9] also observed a seroprevalence of 0.75% among the healthy adults. Notably, present seroprevalence was quite lower than reported by Sawayama et al. [6] among general population (1.7%) and by Joshi et al.[8] among blood donors (1.1%) of Kathmandu valley. Present seroprevalence was fairly higher than reported by Singh[5] among blood donors (0.3%) and by Shrestha [10] among healthy males (0.35%) seeking jobs abroad. Thus, most of the available data regarding anti HCV seroprevalence from Nepal suggest that the seroprevalence among blood donors and among the general population is similar.

Studies from northern India have reported HCV seroprevalence ranging from 0.53 - 5.1% among their blood donors[19,20,21]. Studies from western India have reported HCV seroprevalence ranging from 0.34 - 2.5 %[22,23]. However, the seroprevalence observed in present

study was quite lower than reported by most of the studies in major Indian cities. Present seroprevalence was relatively lower than reported from major cities of Pakistan, who reported the seroprevalence ranging from 1.87%- 6.8% [24, 25, 26, 27, 28]. In Japan and other western economically developed nations, the seroprevalence of anti HCV antibodies has been usually reported to be less than 0.5 % [29, 30]. Thus, it suggests that seroprevalence of HCV among blood donors in Kathmandu valley, is relatively lower than in major cities of South Asian countries but fairly higher than in economically developed countries.

In present study, a statistically significant difference in seroprevalence was observed between male and female blood donors. However, various studies reported that higher seroprevalence rate may be found in either sex [21, 31, 32]. It has been suggested that such a sex wise difference in seroprevalence might be due to differences in the risk behavior, average age of blood donors, donor selection criteria and modes of transmission.

Present study revealed an overall trend of decreasing seroprevalence with increasing age, which was similar to the data reported by Jain et al.[21] from New Delhi of India. Such result might be possibly due to higher exposure rate to HCV in youth, increased possibility of being diagnosed with increasing age and then self exclusion from blood donation. The maximum seroprevalence rate was observed in the age group 21-30 years which was also in accordance with the data reported by Jain et al.[21]. When the data was stratified and gender wise analysis was done this trend was found consistent with male donor population only and in case of female donors the trends was not statistically significant. The total number of female donors in present study was much lower than the total number of male donors, so analysis of a large sample of female donors might prove useful to clarify the age wise trends.

In present study, higher seroprevalence of HCV was observed among volunteer donors (0.7%) than among replacement donors (0.4%) and the difference was statistically significant. Higher prevalence of transfusion transmissible infections and its association with test seeking behavior in community recruited volunteer donors has been discussed by Goncalez et al [33] and others. Higher seroprevalence in volunteer donors than in replacement donors might indicate the test seeking motivation, so only the further studies in this aspect can reveal the scenario of test seeking motivation and its substantial risk in Nepalese blood donors.

Present study revealed an almost similar seroprevalence of anti HCV in first time and repeat blood donors. This result was in accordance with that reported by Jain et al[21] and Chaudhary et al[20] from India. This result was also in accordance with the study by Retrovirus Epidemiology Donor Study (REDS) group[34] who also reported no difference in donor behavioural risk factors and incidence of HCV infection among frequent repeat whole blood donors than infrequent repeat whole blood donors. However, it is the general assumption that regularly repeating volunteer donors are the safest source for blood donation and such donation has been encouraged worldwide.

**Conclusion**

The seroprevalence of anti HCV antibodies among blood donors in Kathmandu valley was similar to the seroprevalence reported for general population by other studies. Similar seroprevalence in first time and repeat blood donors as well as higher seroprevalence in volunteer donors than in replacement donors are the potential threats to safe blood supply. Studies revealing the risk factors of HCV in blood donors population should be conducted and implemented in donor selection strategy, to screen the HCV infected donors who are currently intruding the present donor selection strategy.

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