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RESEARCH ARTICLE

SEROPOSITIVITY OF TRANSFUSION TRANSMISSIBLE HCV INFECTIONS AMONG VOLUNTARY AND REPLACEMENT DONORS

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ABSTRACT

Background: Blood transfusion is a liquid organ transplant and involves transfer of biological material from man to man. According to NACO guidelines, the whole blood or components from any unit that tests positive should be discarded. Preventing transmission of these infectious diseases through blood transfusion presents one of the greatest challenges of transfusion medicine.

Although HCV is endemic worldwide, there is a large degree of geographic variability in its distribution. The epidemiology of hepatitis C in India has not been studied systematically. Most of the studies of the prevalence of hepatitis C have been based in blood banks with the assumption that the blood donors are a surrogate for the population at large.

HCV infection in India has a population prevalence of around 1.5 %. As the screening for HCV has been made mandatory since June 2001, information on HCV infection among blood donors is sketchy and only few studies available.

Hence this study is undertaken to find out the to find and compare seroprevalence of HCV transfusion transmissible infection among voluntary and replacement blood donors and know demographic profile of donors with respect to age and sex.

Materials And Methods: The study was done in Blood bank of S.N Medical College, Bagalkot from July 2012 to June 2013. The blood units were collected from voluntary and replacement donors.

Sample collection: Two ml of blood sample was collected in labeled pilot tube at the time of collection of blood from donor tubing of blood bag the sample was further centrifuged at 3500 rpm for 5 minutes to obtain clear non hemolyzed serum. The samples were tested for HBV. Any donor meeting all criteria's for eligibility of blood donation as mentioned in SOP, Blood Bank, S. N. Medical College, Bagalkot. Any donor not fulfilling the criteria was excluded.

Screening for HCV was done by Rapid test (Rapid diagnostics-J-Mitra & Co) and confirmed by HCV MICROELISA.

Results: A total number of 8187 donor's blood units were screened. Replacement donors constituted 91.13% and remaining 8.7% were voluntary donors. The donor's age ranged between 18-60 years with majority (73.96%) in the range of 18-35 years. 97.39% donors were males and female donors constituted only 2.61%. The seroprevalence of HCV was 0.20% in total donors and all the positive donors were replacement donors and males.

Conclusion: The risk of TTI cannot be eliminated completely even after mandatory testing of blood units because of risk associated with donations during window period. With advent of nucleic acid amplification techniques (NAT) western countries have decreased the risk of TTI to a major extent. But the cost effectiveness of the NAT is poor. Its high cost is of concern especially in economically restricted countries.

Our study showed that the seroprevalence of TTI was more in replacement donors compared to voluntary donors. However it was statistically not significant. Since all the seropositive blood units were from replacement donors and none of screened blood units from voluntary donors showed Seropositivity, the study suggests the need for collection of blood from voluntary donors. There should be an establishment of nationally coordinated blood transfusion services

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INTRODUCTION

Blood transfusion is a liquid organ transplant and involves transfer of biological material from man to man. Many

infectious diseases are likely to be transmitted by blood transfusion like HIV, HBV, HCV, Syphilis, Malaria and among the greatest threats to blood safety of recipient.¹ According to NACO guidelines, the whole blood or components from any

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unit that tests positive should be discarded.² Preventing transmission of these infectious diseases through blood transfusion presents one of the greatest challenges of transfusion medicine.¹

Although HCV is endemic worldwide, there is a large degree of geographic variability in its distribution.³ The epidemiology of hepatitis C in India has not been studied systematically. Most of the studies of the prevalence of hepatitis C have been based in blood banks with the assumption that the blood donors are a surrogate for the population at large.⁴

HCV infection in India has a population prevalence of around 1.5%.⁴ HCV genotypes 2 and 3 are prevalent in 60%-80% of the population and it has been assumed that about 10%-15% of chronic liver disease and Hepatocellular carcinoma are associated with HCV infection.³

As the screening for HCV² has been made mandatory since June 2001, information on HCV infection among blood donors is sketchy and only few studies available.

Hence this study is undertaken to find out the to find and compare seroprevalence of HCV transfusion transmissible infection among voluntary and replacement blood donors and know demographic profile of donors with respect to age and sex.

MATERIALS AND METHODS

The study was done in Blood bank of S.N Medical College, Bagalkot from July 2012 to June 2013. The blood units were collected from voluntary and replacement donors.

Sample collection: Two ml of blood sample was collected in labeled pilot tube at the time of collection of blood from donor tubing of blood bag the sample was further centrifuged at 3500 rpm for 5 minutes to obtain clear non hemolyzed serum. The samples were tested for HCV

Inclusion Criteria

Any donor meeting all criteria's for eligibility of blood donation as mentioned in SOP, Blood Bank, S. N .Medical College, Bagalkot .

Exclusion Criteria

1. Any donor not meeting all criteria's for eligibility of blood donation
2. Any eligible donor having any kind of reaction during the blood donation procedure will be excluded from the studies.
3. Any defects found in the sample collected (bag leakage, improper maintenance of cold chain during transportation, preservation defects, temperature defects, any undesirable physical and biochemical changes in stored blood). Screening for HCV was done by Rapid test (Rapid diagnostics-J-Mitra & Co) and confirmed by HCV MICROELISA.

RESULTS

During the study period total 8187 donors blood units were screened for HCV.

The donor age ranged from 18-60 yrs, majority (73.96%) in the age group of 18-35 yrs.

Out of the 8187 blood donors, 7461 (91.13%) were replacement donors and remaining 726 (8.87%) were voluntary donors as shown in table 1.

Table No.1 Showing Type of blood donors

Type of donor	No. of screened blood units	Percentage
Voluntary	726	8.87%
Replacement	7461	91.13%
Total	8187	100%

Out of the total 8187 donors, males constituted 7974 (97.39%) and only 213 (2.61%) donors were females. Maximum donors were between the age group of 18-35 years constituting 73.96% as depicted in table 2

Table No 2 Age distribution of blood donors

Age in years	No. of donors	Percentage
18-25	2845	34.75%
26-35	3235	39.50%
36-45	1482	18.10%
46 and above	625	7.70%
Total		100%

Out of the total 8187 screened blood units 288 units were seropositive for transfusion transmissible infections (TTI), giving prevalence rate of 3.51% out of this 286 were replacement donors and remaining 2 were voluntary donors - table 3.

Table No.3 Seroprevalence of TTI 1 in total donors

Total No. donors	No. of positive donors	Serporositivity (%)
No. of positive donors	288	3.51
No. of negative donors	7899	

Among 8187 total donors, 17 donors were reactive for HCV antibody, with a seroprevalence of 0.20%. As the above shows that out of the total 8187 screened blood units 17 (0.20%) were seropositive for HCV. All the seropositive units were from replacement donors.

None of the blood units from voluntary donors were positive for HCV table 4. The seroprevalence in replacement donors was 0.22% however the difference was statistically not significant...

Table 4 Seroprevalence of HCV in different donor category

Donor category	No of screened blood units	No. of seropositive units	Percentage
Voluntary	726	0	0%
Replacement	7461	17	0.22%
Total	8187	17	0.20%

Out of the total 17 HCV positive donors 10 were in the age group between 18-35 years table 5.

Table 5 Age wise distribution of HCV positive donors

Age range (yrs)	No. of seropositive	Percentage
18-25	4	23.50%
26-35	6	35.30%
36-45	6	35.30%
46 and above	1	5.90%
Total	17	100.00%

All the 17, HCV positive donors were males. No female donors were positive for HCV.

Out of the 17 HCV positive donors 12 (70.5%) were married and 05 (29.5%) were unmarried.

Out of 17 donors positive for HCV 11 were from urban area and remaining 6 were from rural area.

DISCUSSION

It is impossible to really know the origins of hepatitis C since there are no stored blood samples to test for the virus that are older than 50 years. However, given the nature of the evolution of all viruses, hepatitis C has probably been around for hundreds of thousands of years or more before evolving into the current strains.

Some experts speculate that since HGV/GBV-C, a close relative of HCV, originated in Old and New World primates, the beginnings of HCV might be traced back to 35 million years ago. However, this is just speculation and it is impossible to corroborate these theories at the present time.⁵

In the 1980's, investigators from the Centers for Disease Control (headed up by Daniel W. Bradley) and Chiron (Michael Houghton) identified the virus. In 1990, blood banks began screening blood donors for hepatitis C.⁶

Although HCV is endemic worldwide it is estimated that 3% of the population have been infected with HCV which means there are 170 million chronic carriers the prevalence of HCV antibodies in blood donors in developed countries ranges from 0.4% to 2%.³ There is a large degree of geographic variability in its distribution. Populous nations in the developed world with relatively low rates of HCV seroprevalence include Germany (0.6%), Canada (0.8%), France (1.1%), and Australia (1.1%). Low, but slightly higher seroprevalence rates have been reported in the USA (1.8%), Japan (1.5–2.3%), and Italy (2.2%).³

The prevalence estimated to be 1.5% in India.⁴ The wide variations of HCV seroprevalence in different studies in India might be due to the use of different generation of ELISA test kits, having different sensitivities and specificities.⁷

HCV in India, the epidemiology of hepatitis C in India has not been studied systematically.⁸ Most of the studies of the prevalence of hepatitis C have been based in blood banks with the assumption that the blood donors are a surrogate for the population at large.⁴

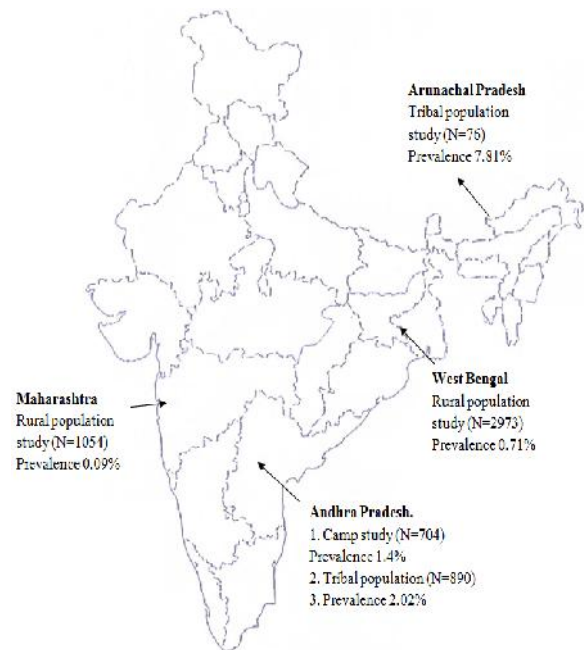


Fig 1 Prevalence of Hepatitis C in studies of the general population.

As the screening for HCV has been made mandatory since June 2001, information on HCV infection among blood donors is sketchy and only few studies available.² HCV infection 75-80% reported to progress to chronic hepatitis of which 10- 20% may progress to cirrhosis and hepatocellular carcinoma.³

Srikrishna *et al* (1999)¹ and Singh *et al* (2004)³ observed the seroprevalence of HCV as 1.02% and 0.5% respectively among the blood donors.

Bhattacharya *et al* (2007)⁹ noted a statistically significant increase in seroprevalence of HCV among blood donors over a period of 2 years. The observed seroprevalence in 2005 was 0.35%

with similar observations being noted by Singh *et al* (2004)³, that the seroprevalence of HCV in voluntary donors was less than that in replacement donors, suggesting that the voluntary donors are safe donors.

In the present study of the total 8187 screened blood units, 17 units were seropositive for HCV. All the 17 seropositive blood units were from replacement donors. None of the screened blood units from voluntary donors were seropositive for HCV. The seroprevalence HCV among total donors in the present study was 0.20%. The seroprevalence among replacement donors was 0.22%, while among the voluntary blood donors the seroprevalence is zero. However the difference in seroprevalence among voluntary and replacement donors was statistically not significant.

The observed seroprevalence of HCV of 0.20% in the present study is comparable with that observed by Pallavi *et al* (2011).¹³

Since all the seropositive blood units were from replacement donors and none of screened blood units from voluntary donors

showed Serporositivity, the study suggests the need for collection of blood from voluntary donors.

Table No 5 Comparison of HCV seroprevalence among donors in different studies

Authors (yrs)	Voluntary	Replacement	Total
Srikrisna et al (1991)1	-	-	1.02
Singh et al (2004)3	0.2%	0.6%	0.5%
Gupta et al (2006)7	0.20	0.65	0.43%
Bhattacharya et al (2007)9	-	-	0.35%
Bagga et al (2007)10	0.58%	0.95%	0.88%
Arora et al (2010)11	-	-	1.0
Fernandes et al (2010)12	-	-	0.06%
Pallavi et al (2011)13	-	-	0.23%
Present study	00	0.22%	0.20%

The prevalence of HCV in preset study is comparatively low. This can be attributed to implementation of strict donor selection criteria followed by rational use of blood.

CONCLUSION

The risk of TTI cannot be eliminated completely even after mandatory testing of blood units because of risk associated with donations during window period. With advent of nucleic acid amplification techniques (NAT) western countries have decreased the risk of TTI to a major extent. But the cost effectiveness of the NAT is poor. Its high cost is of concern especially in economically restricted countries.

Our study showed that the seroprevalence of TTI was more in replacement donors compared to voluntary donors. However it was statistically not significant. Since all the seropositive blood units were from replacement donors and none of screened blood units from voluntary donors showed Serporositivity, the study suggests the need for collection of blood from voluntary donors. There should be an establishment of nationally coordinated blood transfusion services

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