
INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN BIOLOGY AND MEDICINE

ISSN: 2455-944X

www.darshanpublishers.com

DOI:10.22192/ijcrbm

Volume 3, Issue 4 - 2018

Original Research ArticleDOI: <http://dx.doi.org/10.22192/ijcrbm.2018.03.04.007>

Prevalence of antibody to Hepatitis C virus (Anti HCV) amongst the voluntary blood donors in a tertiary care institution

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Abstract

Hepatitis C forms an important cause of viral hepatitis. Antibody to hepatitis C (Anti HCV) is an important marker in the diagnosis of hepatitis C. The prevalence of antibody to hepatitis C (Anti HCV) positivity is (2.22%) among the 180 blood donors in the present study. Profession wise one anti HCV positive case was a truck driver and had a history of sexual contact. One anti HCV positive case was a dhaba worker and had positive history of drug injections. One anti HCV positive donor was a labourer and was of very low socioeconomic status showing the risk of seropositivity in low socioeconomic status. Hepatitis C is a common cause of transfusion related hepatitis.

Keywords: Blood, donor, hepatitis, HCV, virus, jaundice

Introduction

Hepatitis is caused by various hepatotropic viruses more often than other causes like pyogenic organisms, tuberculosis, drugs, toxins and alcohol etc. Hepatitis-C is caused by RNA virus and is parenterally transmitted and also causes chronic carrier state. It causes acute and chronic hepatitis, cirrhosis and even malignancy. Hepatitis-C has high morbidity and chronicity.

Serological studies have indicated that it is the major cause of liver disease worldwide.¹ It is estimated that there are more than 170 million chronic carriers worldwide.² In the United States approximately 150,000 to 170,000 HCV infections occur annually.³ India has more than 12 million carriers of HCV.⁴

Hepatitis C is carried by 0.01 to 2% of blood donors worldwide.⁵ W.H.O. estimated that about 3% of the world population has been infected with population sub group in Africa having prevalence rate as high as 10%.² Other high risk prevalence areas are found in South America and Asia. Hepatitis C virus is the most common cause of post transfusion hepatitis as found by the study of virus specific clone.⁶

The pattern of anti HCV antibody varies according to the stage of infection and differences in the biological responses of different individuals. Sero conversion after HCV infection is usually late which occurs between 4 weeks to 32 weeks⁷, even after 1 year⁸ after

the exposure to virus. In the window period that is before sero conversion patient remains infectious⁹ as will not be detected by anti HCV assay. The appearance of antibody may coincide with or follow transaminase peak.¹⁰ Anti HCV generally persists in the patients in whom the infection progresses to chronicity. During the early phase of primary HCV infection, HCV RNA is the only diagnostic marker of infectivity as it appears in the early phase and is the only tool of diagnosis in seronegative patients.⁶

Government of India recommended the mandatory screening of all blood donors for HCV implemented w.e.f. June 2001.¹¹

Present study was done on 180 cases of blood donors to know hepatitis C positivity and compare the prevalence of hepatitis C virus in relation to profession and other factors.

Materials and Methods

The present study was conducted on 180 cases of blood donors coming at Govt. Medical College and Hospital, Amritsar to know the Hepatitis C virus positivity and compared the prevalence of Hepatitis C virus in relation to profession and other factors as per proforma. History of each donor was taken and recorded in the special proforma attached along with it. Study was conducted to all ages and both sexes of donors coming from different places.

Taking all aseptic precautions 4 cc of blood from each donor was collected. It was centrifuged and clear serum was separated without haemolysis and stored in different vials in the freezer compartment of the refrigerator as specified. These samples were duly coded and divided into twobatches, each batch containing 90 serum samples. Each serum sample was tested for antibody to Hepatitis C virus (Anti HCV) by ELISA method. This test was done to detect antibody to Hepatitis C virus using Hepatitis C virus encoded antigen recombinant core 518, E1,E2/NS4 and NS 5 by LG HCD 3.0 ELISA (Enzyme Linked Immunosorbent Assay) Test system kit supplied by

LG chemical limited. Results were interpreted as per the cut off value. Those serum samples found positive for anti HCV were subjected to repeat ELISA test to reconfirm positivity.

Observations

The present study comprises 180 cases of blood donors of all the ages and both sexes, coming to the Govt. Medical College and Hospital, Amritsar from the different places. The study was undertaken to find out the prevalence of antibody to hepatitis C virus (Anti HCV) in the blood donors and to compare the prevalence of hepatitis C virus in the blood donors in relation to the profession and other factors.

Out of these 180 blood donors 164 (91.11%) donors were males and 16 (8.88%) donors were females. The age of donors ranged from 18-50 years with the highest number of donors in the age group of 21- 30 years. The age of male donors ranged from 18-50 years and was Maximum in the age group of 21-30 years and the age of female donors varied between 18-40 years and was maximum in the age group of 21-30 years. Most of the blood donors were between 20-40 years of age.

In the present study, no commercial blood donor was entertained and was discouraged. Out of 180 blood donors 113 (62.77%) were replacement (needy) donors and 67 (37.22%) were voluntary donors. Among the 113 replacement donors 97 (53.88%) were male donors and 16 (8.88%) were female donors and all 67(37.22%) voluntary donors were males.

In replacement donors age of male donors varies from 18-50 years, maximum number of donors was in the age group 21-30 years and age of female donors varied from 18-40 years, maximum being in the age group of 21-30 years. Among voluntary blood donors age of male donors varied from 18-50 years, maximum donors in the age group of 21-30 years and there was no female voluntary donor. (**Table-1**)

Table-1. Age and Sex Wise Distribution of Replacement and Voluntary Blood Donors

Age (years)	Replacement donors						Voluntary blood donors						Total					
	Male		Female		Total		Male		Female		Total		Male		Female		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
18-20	13	7.22	2	1.11	15	8.33	20	11.11	0	0	20	11.11	33	18.33	2	1.11	35	19.44
21-30	39	21.66	11	6.11	50	27.77	35	19.44	0	0	35	19.44	74	41.11	11	6.11	85	47.22
31-40	33	18.33	3	1.66	36	19.99	9	5.0	0	0	9	5.0	43	23.88	3	1.66	46	25.54
41-50	12	6.66	0	0	12	6.66	3	1.66	0	0	3	1.66	14	7.77	0	0	14	7.77
Total	97	53.88	16	8.88	113	62.76	67	37.22	0	0	67	37.22	164	91.09	16	8.88	180	100

Antibody to hepatitis C virus was detected in 4 (2.22%) cases out of 180 blood donors. All the 4 (2.22%) cases out of 180 blood donors were positive in males and no case was positive in females. In individual sub group, antibody to hepatitis C virus (Anti HCV) was positive in 4 (2.43%) cases out of 164 male blood donors and out of 16 female donors, no

case was positive (0%) showing the male preponderance. The age of 4 (2.22%) positive anti HCV cases in this study which were males varied from 20-40 years with 2 (1.11%) positive cases in the age group of 21-30 years and 2 (1.11%) positive cases in the age group of 31-40 years. (**Table-2**)

Table-2. Distribution of HCV Positive Donors (Out of 180 Blood Donors)

Distribution		No. tested	Male		Female		Total	
			N	%	N	%	N	%
Age (years)	18-20	35	-	-	-	-	-	-
	21-30	85	2	1.11	-	-	2	1.11
	31-40	46	2	1.11	-	-	2	1.11
	41-50	14	-	-	-	-	-	-
	Total	180	4	2.22	-	-	4	2.22
Type of donor	Replacement	113	4	3.53	-	-	4	3.53
	Voluntary	67	-	-	-	-	-	-

Out of 180 blood donors 113 (62.77%) were replacement (Needy) blood donors and 67 (37.22%) were voluntary blood donors. All the 4 (3.53%) cases, positive for anti HCV were among 113 replacement blood donors and all were males. In contrast no case (0%) was positive in 67 voluntary blood donors. This shows the higher prevalence of anti HCV seropositivity among the replacement (3.53%) blood donors than the voluntary (0%) blood donors.

1 (25%) case had positive history of blood transfusion in the past 1 (25%) case had positive history of repeated needle injections taking some drugs. 1 (25%) case had positive history of sexual contact with multiple partners. 1 (25%) case showed no obvious clinical history which indicate possible source of infection, but was of very low socioeconomic status.

Discussion

The methods used to detect hepatitis C virus antibody i.e. Anti HCV, by ELISA method using hepatitis C virus encoded antigen recombinant core 518, E1, E2/NS4 and NS5.

In this study group, 4 cases out of 180 blood donors were positive for anti HCV. Rest of the 176 blood donors were negative for it. Various workers in their different studies gave different values as regards to the prevalence of hepatitis C viruses in blood donors, various risk factors associated with it and other disease states.

After it was found that the majority of the cases of transfusion related viral hepatitis were caused by hepatitis C virus, various researchers have tried to know the exact prevalence of hepatitis C virus among the blood donors, in post transfusion cases and other disease states by demonstrating the antibody to hepatitis C virus (Anti HCV) in the sera of these cases.

Kuhnl et al (1989) found anti HCV positivity in 0.42% of blood donors in Germany.¹² Tao et al (1991) showed anti HCV positivity in 2.1% in normal population at Beijing.¹³ Weiland et al (1992) found anti HCV seropositivity in 0.9 - 2% blood donors from Taiwan and Japan in Asia and from the southern Europe.¹⁴ Williams et al (1992) showed sero positivity in 2.2% of parent population of thalassaemics in London.¹⁵ Darwish et al (1992) showed anti HCV in 14.4% blood donors at Egypt.¹⁶ Leite (1992) found positivity in 3.1% blood-donors in Brazil.¹⁷ Sherlock (1993) showed seropositivity for anti HCV in 0.1 - 2% of blood donors worldwide.⁵ Timan et al (1993) showed prevalence of anti HCV as 1.6% in blood donors at Jakarta, Indonesia.¹⁸ Jaiswal et al (1996) showed in their study the prevalence of anti HCV among the blood donors in different parts of India as in North which varies from 0.3% - 4%, in South 11.3%, East 0 - 0.12% and in Central India 1.78%.¹⁹ Murphy et al (1996) showed seropositivity in 0.36% blood donors in the United States.²⁰ Cantilena et al (1996) screened 954,316 blood donors from 1991-1994 and found anti HCV positivity in 0.5% of donors.¹

WHO (1997) estimated that about 3% of world population has been infected with hepatitis C virus and population sub groups in Africa has prevalence rate as high as 10%.² Ariamkina et al (1998) showed seropositivity in 1.14%- 1.98% in blood donors from 1994-1998.²¹ Choo et al (1998) showed prevalence of anti HCV in 0.4 -1.4% of blood donors.⁷ Deshpande et al (1998) showed anti HCV positivity in 0.34% of blood donors at Mumbai.²² Machave and Dhot (1999) showed prevalence of anti HCV in 0.44% in the blood donors from AFMC, Pune.²³ He also showed that small number of blood donors tested all over the country showed prevalence of anti HCV as 0.2 - 4%.

In the present study, prevalence of anti HCV positivity was in 4 (2.22%) cases out of 180 blood donors. it is quite in accordance with the reports in the previous studies as anti HCV positivity was found in 2.1%¹³, 2.2%¹⁵, 0.3 -4% in North India¹⁹, 0.2- 4% on small

number of blood donors²³ and figures near to the present study as 0.9-2%¹⁴, 3.1%¹⁷, 0.1- 2%⁵, 1.6%¹⁸, 1.78%¹⁹ in central India, about 3%², 1.14-1.98%²¹. It is at variance with the low figures of 0.42%¹², 0.21% in East India¹⁹, 0.36%²⁰, 0.5%¹, 0.4-1.4%⁷ and 0.34%²² and 0.44%²³. Present study is at the variance with the high figures of 14.4%¹⁶, 11.3% in South India¹⁹ and 10% in sub groups in Africa.² Differences in the figures may be due to the regional variations and the study on the small group of population.

1 (25%) case out of 4 anti HCV positive cases had a history of blood transfusion. Various workers in their different studies gave different values of anti HCV positivity after the transfusion which are as found in 10-50%²⁴, 4% in leukemia patients²⁵, 14.3-25%²⁶, 40-75%²⁷, 11.18%¹⁵, 90-95%¹⁸ and 27%¹. (**Table-3**)

Table-3. Prevalence Of Anti HCV Positivity in Post Transfusion Cases

Author	Year	Percentage
Wonke et al ²⁴	1990	10-50%
Murphy et al ²⁵	1990	4.4%
Bhattacharya et al ²⁶	1991	14.3 -25%
Par et al ²⁷	1991	40-75%
William et al ¹⁵	1992	11.18%
Timan et al ¹⁸	1993	90-95%
Cantilena et al ¹	1996	27%
Saxena et al ²⁸	2001	43.9%
La Torre et al ²⁹	2003	5.45-8.5%
Khedmat et al ³⁰	2007	0.093%
Shah et al ³¹	2010	1.57%
Hassanshahi et al ³²	2011	31.5-44.7%
Chandekar et al ³³	2011	0.25%
Kasraian et al ³⁴	2016	30.5%
Present study	2001	25%

The figure in the present study is in accordance with the figures in various studies as 10-50%²⁴, 14.3-25%²⁶, 27%¹. Though the present study differs from the reports given by the various other studies, yet it shows that the epidemiological correlation exists between the transfusion and development of post transfusion hepatitis.

Differences in the figures may be due to regional variation, study on Small group of population and fall in rate of positivity could be due to the Pre transfusion screening of the blood donors and taking better precautionary measures.

1 (25%) positive case was a dhaba worker and used to stay together with other workers. He had a positive history of repeated needle injections taking some drugs. Various workers in different studies showed that risks from the needle injections for anti HCV positivity occur in 22-42%³⁵, 4%³⁶, 10%³⁷, 25%³⁸ and 4%¹. So the present study shows the important mode of transmission of this infection by this route.

1 (25%) positive case was a truck driver and had a positive history of sexual contact with multiple partners. Various studies found risks associated with this mode of spread as 6%³⁹, 6%⁴⁰, 12.5%⁴¹, 7.7%³ and even up to 53%¹. (**Table-4**)

Table-4. Prevalence Of Anti HCV Positivity with History of Sexual Contact

Author	Year	Percentage
Estaben et al ³⁹	1989	6%
Alter et al ⁴²	1990	6%
Klein et al ⁴¹	1991	12.5%
Weinstock et al ³	1993	7.7%
Cantilena et al ¹	1996	53%
Terrault et al ⁴³	2002	1.6-25.5%
Tiftikçi et al ⁴⁴	2009	54-66%
Hassannejad et al ⁴⁵	2012	66.4%
Brogueira et al ⁴⁶	2014	20%
Present study	2001	25%

Differences in the figures could be due to regional variation and study on small group of population but shows that epidemiologically it is an important mode of the transmission of this disease.

1 (25%) positive case was a labourer having very low socioeconomic status and showed no obvious clinical history which indicates possible source of infection. Various studies^{14,42,47} showed that in about 40-50% of cases had no obvious route of transmission of this infection.

Studies^{23,42} showed that the low socioeconomic status is an important risk factor for hepatitis C infection and one of these²³ found that majority of replacement donors (95%) positive for anti HCV were from the low socioeconomic status.

In the present study, regarding the age of positive donors, two cases were in the age group of (21-30 years) and two cases were in the age group of (31-40 years). The first two positive cases which were in the age group of (21-30) years, one case had history of sexual contact and other case had history of needle infections. So both of these positive cases were comparatively in younger age group. The figures in these are in quite accordance with studies which show that highest number of positive cases occur in the age group of (21-40) years²³. The other two positive cases are in the age group of 31-40 years, 1 case had history of transfusion and other case was of low socioeconomic status. The figures are comparable with various studies which showed that the highest number of positive cases occur in the age group of 31-40 years⁴⁸, 30-39 years⁴⁹, 30-39 years²⁰.

The present study differs from the other studies which show that highest number of positive cases occur in the age group of 50-65 years⁵⁰ and 39-65 years⁵¹.

The differences could be due to the fact that present study was conducted on the group which are in the age group of 18-50 years and in this study no blood donor was above the age of 50 years and below the age of 18 years. Maximum number of donors was in the age group of 20-40 years. Also study was conducted on small group of population and some regional variations.

Regarding the sex distribution in the present study, all the 4 anti HCV positive cases were males. This is in quite accordance with the various studies.^{17,20,48}

But the present study differs from a study⁴⁹ which showed that there was a little difference between the male and female donors showing positivity and another study⁵¹ which showed that the prevalence for anti HCV positivity was more in females. Differences could be due to the fact that the blood donors were mainly males (164 cases) than females (16 cases), study on small group of population and some regional variations.

In the present study anti HCV seropositivity was higher (3.53%) in replacement (Needy) blood donors than (0%) in voluntary blood donors. This is quite in accordance with the previous study²³ which showed that seropositivity is higher in replacement (Needy) blood donors than voluntary blood donors.

Conclusions

Hepatitis C forms an important cause of viral hepatitis. Antibody to hepatitis C (Anti HCV) is an important marker in the diagnosis of hepatitis C. Sexual contact and parenteral drug abuse seems to be an important route of transmission in hepatitis C. Also Hepatitis C is a common cause of transfusion related hepatitis.

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How to cite this article:

Chettan Dass, S K Kahlon, P K Kakkar, N.S. Neki. (2018). Prevalence of antibody to Hepatitis C virus (Anti HCV) amongst the voluntary blood donors in a tertiary care institution. *Int. J. Curr. Res. Biol. Med.* 3(4): 31-38. DOI: <http://dx.doi.org/10.22192/ijrbm.2018.03.04.007>