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Seroprevalence of Hepatitis C antibody in Blood Donors

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Abstract

Introduction: India has high prevalence of HCV in blood donors, which is easily transmitted through infected blood. The aim of the present study is to determine the seroprevalence of HCV in 14727 blood donors in Davangere. *Materials & Methods*: The present study was conducted to detect Hepatitis C in blood donors (voluntary and replacement donors) for two years & screening done by ELISA (3rd generationUBIR, HCV EIA.4-0 kit). *Results*: Seroprevalence of HCV was 0.33%, among which 85% were males (13292) and the remaining were females donors (1435).Among 43 positive donors, one donor was illiterate and the remaining 42 were literate. Out of the total positive donors, married donors showed 0.42% and unmarried showed 0.18% seropositivity. Most of the seropositive individuals were in reproductive age group (18-40) Highest prevalence was in age 18-35 years. A, B and O group donors were almost equal in number with AB group constituting least number of donors. *Conclusion*: In conclusion, the present study has established the prevalence the HCV antibody in healthy donors was 0.29% in our area (Davangere). This proves that compulsory screening for HCV lowers the incidence of post transfusion hepatitis (PTH).

Keywords: HCV; Hepatitis C Virus; Sero Prevalence; Blood Donors.

Introduction

The transmission of infectious disease through donated blood is of concern to blood safety, as blood transfusion forms an integral part of medical and surgical therapy.

The patient receives the blood from innumerable private and government blood banks situated allover country. The blood banks are finally responsible for the supply of safe blood products [1]. The Department of Drug Controller have enforced screening for Hepatitis C Virus (HCV) a mandatory to prevent the post transfusion hepatitis.

Hepatitis 'C' is a major global public health problem [2]. As very little data is available in Indian literature, it is very essential to undertake the study to determine the prevalence of HCV antibody in healthy Indian donor population [3].

Hepatitis 'C' occurs throughout life particularly in adulthood and the incidence is higher than Human Immunodeficiency Virus (HIV). The HCV positive donors are known to be viraemic, which is an indication for compulsory screening of all the blood and blood products for HCV infection [4]

The risk of transmitting HCV infection to the recipient from donor is about 1 in 10, 3000 donations [5].

The seroprevalence of HCV in India varies from 0.3% in the North to as high as 11.3% in the South in general population [6]. Anti HCV screening is very effective in reducing prevalence of post transfusion hepatitis in India? Asymptomatic chronic carrier is a potential hazard to the blood recipient. It is conclusively proved that Enzyme linked Immunosorbent Assay (ELISA) screening of blood unit for Hepatitis C infection is highly effective [7].

It is very important to study the prevalence of HCV infection in a healthy blood donor population as it plays a role in the pathogenesis of chronic .active

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hepatitis and cirrhosis of liver. The risk of suffering from HepatoCellular Carcinoma (HCC) is almost definite, though it happens many years after transfusion. Diagnostic tests for HCV were developed soon after identification of HCV.

HCV infection is usually diagnosed by testing for HCV antibodies in serum with an enzyme immuno assay that includes recombinant HCV proteins. Second and later generations of these antibody assays are highly sensitive screening tools.

The average period for diagnosis for HCV sero-conversion after blood transfusion has been shortened with each new generation tests, 7-8 week for ELISA- 3, 10 weeks for ELISA-2 and 16 weeks for ELISA-1 [8]

There is no vaccine available against this virus, which makes the situation graver. Moreover the value of specific antivirion therapy with interferon is unproven. To analyze this we must first examine the available prevalence data in healthy donor population [9]. The currently available UBI, HCV $EIA_{4.0}$ is used to detect antibodies, which employs synthetic peptides for the detection of HCV antibody in human sera or plasma.

This study is conducted to find the prevalence of HCV antibodies in healthy donors with an aim to provide safe blood for transfusion.

Materials and Methods

Source of Data: The population screened constituted healthy, voluntary and replacement donors, who donated blood at Blood bank of Bapuji Hospital Davangere.

Blood Bank of Bapuji Hospital, Department of Pathology J.J.M. Medical College is licensed Blood Bank with average collection of 8000 units of blood from healthy donors, from in and around Davangere, annually.

The blood samples were subjected to HCV screening by ELISA 3rd generation kit. The blood samples were tested as per drugs and cosmetic act and screening for HCV is studied in detail.

Method Employed: The kit used IS UBI^R HCV EIA.4-0. Manufactured by Beijing United Biomedical Co., Ltd., Beijing, PRChina.

Donor Selection: The donors were selected by detailed history and physical examination according to the criteria's lay down in the standard operating procedure of our Blood Bank. Blood samples were collected from all healthy male and female donors. The selected donors were subjected to phlebotomy.

Information regarding age, sex, and habitat, previous h/oblood donation, h/o jaundice was obtained at the time of blood donation. Donors were deferred

or rejected according to the donor selection criteria's. Consent obtained from all donors. Routine investigations were done, and all the clinical and laboratory .manifestation of individuals were documented and analyzed.

Detection of Antibody to HCV

The serum samples were processed for antibody by using 3rd generation ELISA Kit developed by Beijing United biomedical co., Ltd., Bejing.

The kit contained synthetic peptides to highly segments of core, NS3, NS4 and NS5 regions of HCV. The tests were performed and interpreted following the manufacturer's instructions.

Detection of antibody in the serum sample was carried out in an automated Elisa reader (Flex Tek_2^{Tm}) using UBI^R, HCV EIA.4-0 kits.

Results

Voluntary Donors

The present study is undertaken to know the prevalence of HCV antibody in healthy blood donors, in the blood bank of Bapuji Hospital, J.J.M. Medical College, Davangere. The number of male donors were 89.39% and female donors were 10.60% among the total donors. Total number of donors screened during the study were categorized into Voluntary and replacement donors who constituted 43.39% and 56.61% respectively. The number of male donors were 89.39% and female donors were 10.60% among the total donors.Age of voluntary donors ranged from 18-46 years, with maximum donors, between 18-36 years.

Among the total voluntary donors screened 711 (11.13%) were illiterate And 5679 (88.87%) were literate. Most of them belonged to class II, constituting 46.53%, followed by class I and class III with 28.39% and 25.08% respectively.

Class I: (skilled and unskilled); Class II: (Students, professionals, Health Care Workers); Class III: (Lorry drivers, Business men). The number of donors were under married category were 3109 (48.65%) and unmarried were 3281 (51.35%) constituting 48.65 % and 51.35 % respectively.

Replacement Donors: Among 8337 replacement donors 89.58% were male and 10.42% were female

donors. Maximum replacement donors were between 18-36 years of age group.

Maximum replacement donors were literate, constituting 88.86% and the illiterate were 11.13%. Maximum donors came under class II, constituting 46.53%, with class I And II constituting 28.38 and 25.09% respectively.

Out of the total replacement donors 4056 (48.65%) of them were married and 4281 (51.35%) were unmarried.

Sex Predilection in Positive Donors

Seropositivity among the donors screened were 7 in voluntary donors and 36 in replacement donors. None of the female donors showed seropositivity, as shown in Table 1.

Age Incidence in HCV Positive Donors

Maximum number of HCV positive donors were in the age group of 18-35 years (Table 2).

Education and Marital Status in Positive Donors

Among 43 cases, only 1 donor was illiterate and remaining 42 were literate.

Out of the total married donors, seropositivity was 0.05% in voluntary donors and 0.36% in replacement donors. Unmarried donors showed 0.04% of seropositivity in voluntary donors and 0.14% in replacement donors (Table 3).

Occupation Status in Positive Donors

In class I category 16 positive donors showed a seropositivity of 0.28%, class II- 0.2% and class III 0.42% (Table 4).

Blood Groups in Positive Donors

Of the 43 seropositive donors ABO blood groups distribution is shown in above table.

Among 43 HCV positive donors, urban population constituted 0.36% and 0.16% donors were from rural areas (Table 5).

Table 1:

Sex	Total	Voluntary	Seropositivity Replacement	Total	Percentage
Male	13165	7	36	43	0.33
Female	1562	-	-	-	-
Total	**14727**	**7**	**36**	**43**	**0.29**

Table 2:

Age	Voluntary donors			Replacement donors			Total donors		
	No.	HCV+ve	%	No.	HCV+ve	%	No.	HCV+ve	%
18-25	2752	6	0.22	3595	14	0.39	6347	20	0.32
26-35	2676	1	0.04	3492	19	0.54	6168	20	0.33
36-45	877	-	-	1133	03	0.26	2010	03	0.15
46 & above	85	-	-	117	-	-	202	-	-
Total	6390	7	0.11	8337	36	0.43	14727	43	0.29

Table 3:

Variable Particulars		Total donors	Seropositivity Voluntary	Seropositivity Replacement	Total	Percentage
Education	Illiterate	1639	0	1 (0.06%)	1	0.06
	Literate	13088	7 (0.05%)	35 (0.27%)	42	0.32
Marital status	Married	7165	4 (0.05%)	26 (0.36%)	30	0.42
	Unmarried	7162	3 (0.04%)	10 (0.14%)	13	0.18

Table 4:

Occupation	Total	Seropositive donors			Percentage
		Voluntary	Replacement	Total	
Class I	5716	-	16	16	0.28
Class II	5315	5	6	11	0.20
Class III	3696	2	14	16	0.42
Total	**14727**	7	**36**	**43**	**0.29**

Table 5:

Blood Groups	Total	Seropositivity			Percentage
		Voluntary	Replacement	Total	
	3697	4	12	16	0.43
	4856	1	8	9	0.18
O	4991	2	14	16	0.32
AB	1183	-	2	2	0.17
Total	14727	7	36	43	0.29

Discussion

The study was undertaken to determine the seroprevalence of HCV antibody among healthy donors in the Blood Bank, Bapuji Hospital, J.J.M. Medical College, Davangere. The total number of donors screened for HCV antibody by the ELISA kit of 3rd generationwas 14727.

HCV is one of the transfusion transmissible infection, the prevalence of which varies in different parts of the world from 0.04 to 26%. It is very important to study the prevalence in healthy blood donor population as it plays an important role in the pathogenesis of chronic active hepatitis and cirrhosis of liver. The risk of patient suffering from hepatocellular carcinoma is definite though happens several years after transfusion.

As there is paucity of data of HCV infection from Indian literature, this study is undertaken to know the seroprevalence among healthy donors in and around Davangere [11,12].

Age Incidence

In the present study maximum number of seropositive persons were in the age groups of 18-40 years suggesting that heterosexual contact (reproductive age) is the common mode of transmission. This is compatible with other studies, shown in the table. The more common age group of our study ranged from 18-40 years, which is almost similar to other studies [2,11,12].

In other studies the age group varied from 21 years to 50 years. The minimum number (age group >46 years) in our study may be due to deferred or rejection according to selection criteria. The difference in prevalence of anti HCV reactivity in various age groups is found to be statically significant as shown in comparision Table 6.

Table 6: Comparision table

Study	Age incidence	Seroprevalence
Makroo R MOO [12]	31-40 years	0.95%
Phukan A C [13]	21-30 years	6.25%
Arankalle V A[11]	16-25 years	0.12%
Deshpande Anand[2]	21-30 years	0.32%
Present study Davangere	18-35 years	0.33%

Sex Predilection

HCV infection shows specific sex predilection. Seropositivity is more in males compared to females in all categories of our study, could be due to more coverage of males for screening and high risk behaviors are common among them. The reason for total absence of anti HCV positivity in female donors is unexplainable. However, it can be due to strict donor selection criteria. Findings were similar to other studies as shown in the table, except the study done by A. Alnaqdy et al (2003) where the male and female donors are almost equal in number. As shown in Comparision Table 7.

Table 7: Comparision Table

Study	Seropositivity			
	Male	%	Female	%
DespandeAnand[2]	12854	.34	771	0.38
Phukan A.C[13]	35	11.43	41	8.88
Present study	13165	0.33	1562	-

Education Status

Education plays an important role in bringing the desirable change in attitude and practices. It is very essential to create awareness on the infections transmitted through blood and other routes.

Majority of the seropositive donors of the present

study were educated, constituting 0.32%, of positive sera, due to screening of larger population of donors from this catagery. The similar comparison was done by Phukan AC. In a remote area, where illiterates were in majority among the 76 donors screened (75%). As shown in Comparision Table 8 below-

Table 8: Comparision table

	illiterate	literate
Phukan AC (2001)	8.77%	7.14%
Present study	0.06%	0.32%

Marital Status

The marital status of the HCV seropositive persons has significant impact on the prevalence rate of HCV positivity in a given area. Seropositive married men can place all his family members at a higher risk for acquiring infection than any unmarried man. Majority of seropositive individuals were married (0.42%) and unmarried were (0.18%). In the present study chances of missing out a lot of HCV positive cases may be seen because whole family was not screened and hence the observed seroprevalence in our study is an under-estimation of actual prevalence of HCV in marital status.

Occupation

In our study, majority of the donors who were seropositive belonged to occupation class III (0.42%) followed by class I (0.28%) and class II (0.2%) indicating the HCV infection is more common in business men and lorry drivers followed by students and professionals. It shows no significant variation between occupational classes. Mathai Jaisy (2002) study has similar observations. In Phukan's study shows 96% of cultivators with seropositivily.8.57%.

Blood Groups

In the present study, we observed equal number of donors in all ABO blood groups with slight increase in A positive blood group (0.43%). The relative incidence of HCV positivity among individuals of different blood groups was not significant in our study. It is supported by a study done by Mathai Jaisy 2002.

Conclusion

It has been established that the incidence of post transfusion hepatitis C infection decreased considerably after screening the blood for antibody by third generation ELISA tests. Co-infection of HBsAg and HCV will be responsible for development of HCC. In conclusion, the present study has established the prevalence the HCV antibody in healthy donors was 0.29% in our area (Davangere). Our study has shown the age incidence between 18 – 35 years in Males who are literate and married. Different blood groups was not significant. This proves that compulsory screening for HCV lowers the incidence of post transfusion hepatitis (PTH).

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