Original Research Article

Prevalence of Hepatitis C Virus among blood donors in Blood Bank of Jhalawar Hospital & Medical College Society, Jhalawar Rajasthan

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Abstract

Introduction: Hepatitis C infection continue to be a threat to safe transfusion practices. This study aims to determine the prevalence of Hepatitis- C virus (HCV) among voluntary and replacement blood donors in Blood Bank of Jhalawar Hospital & Medical College Society, Jhalawar, Rajasthan. **Material and Methods:** A retrospective review of donors record covering the period between Jan 2017 to Dec 2017 at Jhalawar Hospital & Medical College Society, Jhalawar, Rajasthan. The blood collections were taken from the voluntary donors at total 69 blood donation camp and as well as from replacement donors and voluntary donors at blood bank. The blood samples were then obtained by standard procedures of venepuncture. Total 16495 blood donors screened over the period of one year. Antibodies to Hepatitis C virus in serum/plasma is detected by rapid test kit. **Results:** 34 out of 16495 donor population were positive for Hepatitis C (Prevalence 0.2%). **Conclusion:** Replacement donors were higher prevalence than the voluntary donors. So, the present study concludes that motivating voluntary blood donors by conducting voluntary blood donation camp is the most effective way of ensuring adequate supplies of safe blood and blood components for transfusion.

Keywords: Blood donors, HCV, Replacement donors, Voluntary donors

Introduction

Blood donation is the most important and essential part of blood transfusion services, usually donated voluntarily or in the form of replacement. Millions of lives are saved each year through blood transfusions, who have lost large volumes of blood from serious accidents, major Surgical Operation, Cancer patients requiring therapy, women with haemorrhage at childbirth, patients of hereditary disorders like Haemophilia and Thalassaemia, Severe burn victims as well as for individuals who have symptomatic anemia from medical or hematologic conditions or cancers.

Blood transfusion carries the risk of transmitting major infections such as hepatitis, HIV, syphilis, and malaria. In minority cases, viral infections such as cytomegalo-virus, herpes virus, and Epstein–Barr virus along with toxoplasmosis and brucellosis may be transmitted [1]. Therefore, Blood banks are obligated to provide adequate and safe blood to the community. In India, it is mandatory to test every unit of blood collected for hepatitis B, hepatitis C, HIV, syphilis and malaria [2]. If donors test positive to any of the five infections, their blood is discarded.

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Hepatitis C virus (HCV) is a hepatotropic virus which was first discovered in 1989 as an important cause of transfusion associated hepatitis ("non-A, non-B hepatitis" or NANBH). It produces a slowly progressive liver disease, namely hepatitis, cirrhosis, and hepato-cellular carcinoma (HCC). It is the most common cause of chronic hepatitis worldwide [3]. It is affecting over 170 million people (3%) world over. More than 3 millionpeople are affected annually [3]. HCV belonging to Flaviviridae family and genus Hepacivirus.

The genome of HCV is a single-stranded, positive-sense RNA molecule (++ss RNA) of approximately 9.6 kb in length. composed of a long open reading frame (ORF) flanked by untranslated regions (UTR's) at both the ends. The precursor is cleaved into at least 10 different proteins: the structural proteins: Core, E1, E2, and p7; as well as the non-structural (NS) proteins: NS2, NS3, NS4A, NS4B, NS5A, and NS5B. An important feature of the HCV genome is its high degree of genetic variability. The E1 and E2 regions are the most variable, while the 5'UTR and terminal segment of the 3'UTR are highly conserved. HCV has a high propensity for establishing chronic infection [4]. The high-risk populations for HCV infection include injectable drug users (IDU), blood transfusion

recipients, sexually promiscuous individuals, haemo-dialysis patients, HIV positive persons, kidney transplant recipients and prisoners. Among all these, the IDU are highest in number, and this is the primary mode of HCV transmission in developed countries. Though the transfusion of blood and blood products was a leading cause of transmission of HCV, after the introduction of screening of blood units for HCV in blood banks in 1990, such a transmission has decreased in most of the developed countries. Unfortunately, the incidence of transfusion related hepatitis C is still higher in developing countries like India [5].

The HCV antigen is of core variety. The incubation period is 50–150 days. HCV spreads through blood, sexual activity when mixed with infected blood, and through the placenta. Using used needles during intravenous drug abuse and in unsafe healthcare setups are major risk factors. No vaccine is available against HCV [3].

Because of genomic instability and the antigenic variability have seriously hampered the efforts which were made for developing an HCV vaccine. The present study was conducted to determine the prevalence of HCV antibodies among blood donors at Blood Bank of Jhalawar Hospital &Medical College Society, Jhalawar, Rajasthan.

Material & Methods

Type of study: Retrospective study

Place and Duration of study: Blood Bank, Jhalawar hospital & medical college society, Jhalawar, Rajasthan covering the period between Jan 2017 to Dec 2017.

Sampling Methods: All records including TTI records, donor registers, completely filled donor forms, whichincluded the type of donation (voluntary/ replacement), the patient's details, pre-donation questionnaire, counselling details and medical examination findings available for each case were analysed. The samples from all blood donations were screened for HIV 1-2, HBs Ag, HCV, syphilis and malaria. Antibodies to Hepatitis C virus in serum/ plasmais detected by rapid test kit.

Statistical Methods: All Data were collected for HCV and analysed in percentage

Result

Out of the 16495 blood donors, 5013 were voluntary donors and 11482 were replacement donors. Maximum blood donors were Rh positive. There was a higher rate of male blood donation than females**.**

Totally, 2.25% (n = 371) bags were positive for transfusion transmitted infections (TTI) out of 16495 donors**.** Prevalence of Hepatitis B is highest 1.88% (311 donors) followed by infected with HCV 0.20% (34 donors), HIV 0.10% (17 donors), malaria 0.03% (5 donors) and syhlilis 0.024% (4 donors) Table 1. Hepatitis B was the leading cause among the TTI 83.82% followed HCV 9.16% and HIV 4.58% (Table 2).

Table-1: Various TTI among total blood donors.

Transfusion transmitted infections	Voluntary donors (5013)	Replacement donors (11486)	Total (voluntary +Replacement) (16495)
1. Hepatitis C	**03**	**31**	**34**
2. Hepatitis B	109	202	311
3. HIV	03	14	17
4. Syphilis	0	4	4
5. Malaria	0	5	5

Table-2: Percentage of various infections in total TTI.

Transfusion transmitted infections	% of total TTI
Hepatitis C	**9.16%**
Hepatitis B	83.82%
HIV	4.58%
Syphilis	1.078%
Malaria	1.34%

34 out of 16495 donor population were positive for anti HCV. (3 voluntary donors and 31 were replacement donors). There was high prevalence of Hepatitis C in replacement donors (0.269%) compare to voluntary donors (0.0598%).

Discussion

Blood transfusion services are an integral part of health care system, which potentially saves lots of lives every day. Over one lakh people get infected by the HCV virus every year in India. According to the Indian National Association for the Study of the Liver, nearly 12.5 million Indians are suffering from the Hepatitis C disease, with the death rate exceeding over one lakh. Hepatitis C has increasingly been found to be a significant aetiological agent which causes liver disease in India. Which could lead to chronic hepatitis, cirrhosis, and even hepatocellular carcinoma [21]. The Hepatitis C infection is one of the transfusion transmissible infections and the principal etiologic agent of post-transfusion hepatitis. hence, it is mandatory to test all the blood donors for its presence. To ensure the transfusion of safe blood to the recipient, not only a mandatory screening of such infection markers is necessary, but it is also important to study the prevalence and the risk factors of the HCV infection among the donor population.

The virus is distributed worldwide with prevalence varying from 0.2% up to 40% in different countries. Higher HCV prevalence were reported in Southeast Asian countries, including India (1.5%), Malaysia (2.3%), Philippines (2.3%), Pakistan (8.1%), and in equatorial Africa (6.5%), as high as 20% in Egypt [6].

In the present retrospective study, we evaluated the seroprevalence of the Hepatitis C virus among the blood donors in blood bank, Jhalawar hospital & Medical college society, Jhalawar, Rajasthan. This study gave an overview of the prevalence of the disease in the community.

Present study showed that anti-HCV seroprevalence in the area was lower (0.2%). it was closer to that studies were conducted by Meena et al (0.21%)[9], Garg S et al (0.29)[8] and Bhattacharya *et al*(0.31%) [17] The prevalence from the differentstudies in different regions of India were compared in table 3. The data will help in evaluating the seroprevalence of the Hepatitis C infection in India (TABLE 3)

Table-3: Comparison HCV seropositive prevalence of various studies with present study.

S.N.	Study	HCV Seropositivity (%)
1	Giri PA et al 2012,rural tertiary care teaching hospital in Maharastra[7]	0.74%
2	Garg S et al 2001, Rajasthan [8]	0.29%
3	Meena M et al2011, AIIMS New Delhi[9]	0.21%
4	Gupta PK et al 2006, Armed Forces[10]	0.51%
5	Narayankar SL et al 2016 Mumbai [11]	1.49%
6	kaur H et al 2012 Amritsar,Punjab[12]	0.74%
7	Poddar N*et al* 2012, Odisha [13]	0.66%
8	Bhawani Y et al 2010,Andhra Pradesh[14]	0.84%
9	Kochhar AK et al 2012,Southern Haryana[15]	0.72%
10	Gupta N *et al* 2004, Ludhiana,Punjab [16]	1.09%
11	Bhattacharya P *et al* 2007, Kolkata [17]	0.31%
12	Chandra T *et al* 2009, Lucknow [18]	0.85 %
13	Arora D *et al* 2010, Haryana [19]	1.00 %
14	Thakral B et al 2006, PGI, Chandigarh [20],	0.44%
15	Kulkarni N *et al* 2012, Karnataka [1]	0.35%
16	Das BK *et al*.2011, Kolkata [22]	0.35%
17	Present study	0.20%

Authors Gupta N et al (1.09%)[10] and Narayankar SL et al(1.49%)[11] found prevalence more than 1% of HCV among blood donors. Several studies on voluntary and mixed (voluntary +replacement) blood donors shows a prevalence of hepatitis below 2% in India. The reported variation in the prevalence of anti-HCV antibodies among blood donors in different regions of the world may be attributed to the differences in the donation type, literacy rate and level of awareness among the blood donors [11]. In the United States seroprevalence in HCV of blood donors was estimated to be 0.3 percent [23]. In Greece also, a low prevalence (0.2 to 0.4%) of HCV were reported and a similarly low rate (0.13%)

was also reported from Iran. Lower rates of anti-HCV antibodies were reported in blood donors of Turkey (0.07%), Saudi Arabia (0.4%), Mexico (0.84%) and Kenya (0.9%) [23]. The World Health Organization estimates that the world-wide prevalence of HCV infection is approximately 3% [24].

Presently in India, donor screening for HCV infection is based mainly on detection of specific antibody in serum. This does not detect individuals in window period, which is much longer for HCV infection, approximately 66 days, due to delayed antibody production [25,26]. Thus, an antibody based detection fails to diagnose the infection during this period. However, viral particles become detectable earlier, in approximately one week. Based on this, nucleic acid testing (NAT) can be used as an alternative [27]. A recent report from New Delhi showed that 38 sera from VBD were positive for HCV by NAT, while of these 38, only 35 were positive for anti-HCV by ELISA. Relying only on ELISA would miss few cases [28]. High costs, a greater turnover time and a need of high technical expertise are the limiting factors in the way of the generalized use of NAT, more so in developing countries

The HCV positive donors should be informed about their disease, counseled and referred to a hepatologist. They should also be permanently deferred for future donations [20].

Conclusion

Our study result showed that (1) Blood donors in Blood Bank, Jhalawar hospital & Medical college society, Jhalawar, Rajasthan have a 0.20% prevalence of Hepatitis C(2) The seroprevalence was more in replacement donors as compared to voluntary donors. Therefore,Voluntary donations are safer as compared to replacement donation.

So, the present study concludes that motivating voluntary blood donors by conducting voluntary blood donation camp is the most effective way of ensuring adequate supplies of safe blood and blood components for transfusion.

This study provides reliable data on the prevalence of HCV infection among blood donors and may be helpful in providing insight into disease burden and opportunities for prevention.

Recommendations

1. As no vaccine is available and as the treatment is expensive and prolonged, with a poor success rate, strict donor selection remains a key for primary prevention of HCV transmission.
2. Blood camps should be increased to encourage the people for voluntary blood donation, particularly in a developing country like India where availability of safe blood and blood components for transfusion is main challenge.
3. More sensitive tests to detect anti HCV antibodies and nucleic acid testing (NAT)for HCV is recommended to detect the infection at an earlier stage, which will protect more recipients.
4. Proper sterilization of medical equipment, especially syringes and needles in healthcare settings, proper disposal of contaminated material are highly recommended.

Contribution from authors

- **Dr. Manish Kumar:** Preparation of manuscript, Data collection, Data compiling, literature review, final approval.
- **Dr. Yogendra Madan:** Manuscript editing, literature review, final approval.

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References

1. Kulkarni N. Analysis of the seroprevalence of HIV, HBsAg, HCV and syphilitic infections detected in the pre-tranfusion blood: A short report. International Journal of Blood Transfusion and Immunohematology 2012; 2:1-3. doi:10.5348/ijbti-2012-6-SR-1

2. Choudhury N, Desai P. Blood bank regulations in India. Clin Lab Med. 2012 Jun; 32 (2): 293-9. doi: 10. 1016/j.cll.2012.04.002.

3. Shekhar, S. Hepatitis C Virus Infection in the Indian Sub-Continent, January 2018;83-95. https://doi.org/10. 1016 /b978-0-12-803233-6.00008-4

4. Lemon SM, Walker C, Alter MJ, Min Kyung Y. Hepatitis C virus. In: Knipe DM, Howley PM, editors. Field's Virology. 5th ed. Netherlands, Philadelphia: Wolters Kluwer, Lippincott Williams & Wilkins; 2007. pp. 1253–304

5. Alter MJ. Epidemiology of hepatitis C virus infection. World J Gastroenterol. 2007 May 7; 13 (17): 2436-41.

6. Khodabandehloo M, Roshani D, Sayehmiri K. Prevalence and trend of hepatitis C virus infection among blood donors in Iran: A systematic review and meta-analysis. J Res Med Sci. 2013 Aug; 18 (8): 674-82.

7. Giri PA, Deshpande JD, Phalke DB, et al. Seroprevalence of transfusion transmissible infections among voluntary blood donors at a tertiary care teaching hospital in rural area of India. J Family Med Prim Care. 2012 Jan 1(1): 48-51. doi: 10. 4103/ 2249-4863. 94452.

8. Garg S, Mathur DR, Garg DK. Comparison of seropositivity of HIV, HBV, HCV and syphilis in replacement and voluntary blood donors in western India. Indian J Pathol Microbiol. 2001 Oct; 44 (4): 409-12.

9. Meena M, Jindal T, Hazarika A. Prevalence of hepatitis B virus and hepatitis C virus among blood donors at a tertiary care hospital in India: a five-year study. Transfusion. 2011 Jan;51(1):198-202. doi: 10. 1111/j.1537-2995.2010.02801.x.

10. Gupta PK, Kumar H, Basannar DR, Jaiprakash M. Transfusion transmitted infections in the armed forces: prevalence and trends. *MJAFI*. 2006; 62 (4): 348-50. doi: 10. 1016/ S0 377-1237 (06) 80105-X

11. Narayankar SL, Maindad VC (2016). Prevalence of Hepatitis C among Voluntary Blood Donors in Mumbai, 04 (11), 13717. https://doi.org/10. 18535/ jmscr /v4i11.35

12. Kaur H, Manjari M, Thaman RG, Singh G, Prevalence of markers of hepatitis c virus among the blood donors *J Clin Diagn Res* 2012 6 (6): 959-62.

13. Poddar N, Lenka PR, Chayani N, Mohanty S, Mallick B, Pattnaik D, Seroprevalence of hepatitis-c virus in blood donors and high risk individuals *J Evol Med and Dent Sci* 2012 1(6):959-63.

14. Bhawani Y, Rao PR, Sudhakar V, Seroprevalence of transfusion transmissible infections among blood donors in a tertiary care hospital of Andhra Pradesh *Biology and Medicine* 2010 2(4):45-8.

15. Kochhar AK, Duggal G. Trend in seroprevalence of hepatitis C virus infection among blood donors of southern Haryana. JARBS 2012 4:219-22.

16. Gupta N, Kumar V, Kaur A. et al. Seroprevalence of HIV, HBV, HCV and syphilis in voluntary blood donors. Indian J Med Sci. 2004 Jun;58(6):255-7.

17. Bhattacharya P, Chandra PK, Datta S, Significant increase in HBV, HCV, HIV and syphilis infections among blood donors in West Bengal, Eastern India 2004-2005: exploratory screening reveals high frequency of occult HBV infection. World J Gastroenterol. 2007 Jul 21;13(27):3730-3.

18. Chandra T, Kumar A, Gupta A. Prevalence of transfusion transmitted infections in blood donors: an Indian experience. Trop Doct. 2009 Jul;39(3):152-4. doi: 10.1258/td.2008.080330.

19. Arora D, Arora B, Khetarpal A. Seroprevalence of HIV, HBV, HCV and syphilis in blood donors in Southern Haryana. Indian J Pathol Microbiol. 2010 Apr-Jun;53(2):308-9. doi: 10.4103/0377-4929.64295.

20. Thakral B, Marwaha N, Chawla YK, et al. Prevalence & significance of hepatitis C virus (HCV) seropositivity in blood donors. Indian J Med Res. 2006 Oct;124(4):431-8.

21. Mukhopadhya A. Hepatitis C in India. J.*Biosci.* 2008; 33:465-73.

22. Das BK, Gayen BK, Aditya S, Chakrovorty SK, Datta PK, Joseph A. Seroprevalence of Hepatitis B, Hepatitis C, and human immunode fi ciency virus among healthy voluntary first time blood donors in Kolkata. Ann Trop Med Public Health. 2011; 4(2): 86-90. DOI: 10.4103/1755-6783.85758

23. Makroo RN, Walia RS, Chowdhry M, et al. Seroprevalence of anti-HCV antibodies among blood donors of north India. Indian J Med Res. 2013; 138: 125-8.

24. Yeung CY, Lee HC, Chan WT, Jiang CB, Chang SW, Chuang CK. Vertical transmission of hepatitis C virus: Current knowledge and perspectives. World J Hepatol 2014 Sep 27;6(9);643-51. doi: 10.4254/wjh. v6.i9.643

25. Kucirka LM, Sarathy H, Govindan P, et al. Risk of window period hepatitis-C infection in high infectious risk donors: systematic review and meta-analysis. Am J Transplant. 2011 Jun;11(6):1188-200. doi: 10.1111/j. 1600-6143. 2011.03460.x.Epub 2011 Mar 14.

26. Rehermann B. Hepatitis C virus versus innate and adaptive immune responses: a tale of coevolution and coexistence. J Clin Invest. 2009 Jul; 119 (7): 1745-54. doi: 10.1172/JCI39133. Epub 2009 Jul 1.

27. Singer AL, Kucirka LM, Namuyinga RHC, Subramanian AK, Segev DL. The high risk donor: Viral infections in solid organ transplantation. Current Opinion Org Transpl. 2008 aug; 13 (4): 400–4.doi: 10. 1097/ MOT.0b013e3283094ba3.

28. Chatterjee K, Coshic P, Borgohain M, et al. Individual donor nucleic acid testing for blood safety against HIV-1 and hepatitis B and C viruses in a tertiary care hospital. Natl Med J India. 2012 Jul-Aug; 25 (4): 207-9.

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