

Seroprevalence and Trend of Hepatitis C Virus among Asymptomatic South Indian Population -A Five Year Study at a Regional Blood Transfusion Centre

Shaiji P.S.¹, Meena D.²

ABSTRACT

Introduction: Blood transfusion serves as a major transmitter of hepatitis C because of its potential to transmit a high magnitude of infective virus into the recipient. Transfusion Services strive to exclude potential infective donors through stringent selection of donors. Study attempts to estimate the prevalence of seropositivity for Hepatitis C among blood donors at Dept of Transfusion Medicine, Govt. Medical College, Thiruvananthapuram.

Material and Methods: 155275 blood donors who donated whole blood over a span of 5 years from 2012 January to 2016 December were screened with ELISA for anti Hepatitis C antibodies. Percentage of seroreactivity was noted. Trend was statistically analysed by Chi square test.

Result: 1121 (0.72%) samples were found to be seroreactive. Yearwise prevalences remained <1% (ranging from 0.96% in 2012 to 0.86% in 2016 and overall prevalence during 6 years was 0.72%). There was a statistically significant decreasing trend.

Conclusion: Seroprevalence of Hepatitis C remains well below 1% for past 5 years and it is steadily decreasing. Still with more effective counselling measures and donor selection, there is scope for further reduction to a near zero seroprevalence.

Keywords: Seroprevalence, Trend of Hepatitis C Virus

INTRODUCTION

Chronic infection with hepatitis C virus (HCV) has emerged as a major public health problem since past decades. Globally, an estimated 71 million people have chronic hepatitis C infection according to latest WHO reports. Estimates obtained from modelling suggest that worldwide, in 2015, there were 1.75 million new HCV infections which amounts to 23.7 new HCV infections per 100 000 people.¹ A significant number of those who are chronically infected will develop cirrhosis or liver cancer. Although antiviral medicines can cure more than 95% of persons with hepatitis C infection, thereby reducing the risk of death from liver cancer and cirrhosis, access to diagnosis and treatment is low. The fact that there is currently no vaccine for hepatitis C and liver cancer adds to the gravity of the problem.¹ Most common modes of infection with Hepatitis C are through exposure to small quantities of blood. This may happen through injection drug use, unsafe injection practices, unsafe health care, and the transfusion of blood and blood products.² Blood transfusion serves as a major transmitter of hepatitis C because of its potential to transmit a high

magnitude of infective virus into the recipient

The risk of HCV transmission via blood transfusion was substantial before the introduction of anti-HCV screening, as high as 1% in U.K. With the introduction of anti-HCV screening in the early 1990s and improvement in the anti-HCV testing over time, the risk was reduced to approximately 1 in 200 000 transfused units.³ Further With the introduction of NAT, such risk in the USA is approximately 0.03 to 0.5 in 1 000 000 units using mini-pool donor testing.⁴

the implementation of a ban on professional blood donation in 1998, many blood centers refocused on methods to motivate voluntary donors, mostly through voluntary blood collection camps. In recent years, the true voluntary donors are gradually becoming the main source of blood donation in many blood centers. Moreover efficient counselling measures to eliminate high risk donors have been developed enhancing the additional level of safety. Yet phasing out and abolishing replacement donation totally is one of the biggest challenge faced by Indian blood banks.

We examined the serological profile of 155275 donors donating blood over a span of 6 years and analysed the trend in seroreactivity over the years. This may be helpful in identifying the loopholes in donor screening and restructuring strategies for minimising TTI index. It may be beneficial to track the trend in seroprevalence over the years which in turn reflects the efficiency of measures taken by blood services to enhance blood safety. It also may give us a rough estimate of prevalence in asymptomatic adult population in south Kerala.

MATERIAL AND METHODS

155275 subjects who donated whole blood, from January 2012 to December 2016 at Govt. Medical College, Trivandrum were included in the present study. A thorough clinical history, medical examination and selection of donors were done according to Standard Operating Procedures

¹Assistant Professor, ²Professor and Head, Department of Transfusion Medicine, Government Medical College Thiruvananthapuram, India

Corresponding author: Shaiji. P.S., Assistant Professor, Department of Transfusion Medicine, Government Medical College, Thiruvananthapuram, India

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of Department. Demographic data was recorded. 5 ml anticoagulated blood collected at the time of blood donation was used for testing. All the donors were tested for hepatitis C with a third generation ELISA (ERBA Lisa, M/s Transasia Biomedicals) for anti HCV antibodies against HCV Core antigen, NS3, NS4, NS5. Acceptance criteria which were laid down by the manufacturer for the absorbance of the reagent blank as well as for the mean absorbance of the positive and negative controls which were provided with the test kits were strictly followed. The cut off value was calculated as per manufacturer's directions for reporting the positive and the negative results. Apart from manufacturer control, known in house positive and negative samples were used randomly as the external controls in each screening. The samples which were found seroreactive were repeated in duplication by ELISA and those found reactive in at least one of the repeated tests were taken as seroreactive.

STATISTICAL ANALYSIS

Data was entered in excel on a daily basis and analysed with SPSS. Frequencies were reported as percentages. Chi-squared statistics for trend was used to estimate whether a significant difference existed between the yearly prevalence of Hepatitis- C.

RESULTS

A total of 155275 blood samples were analysed for presence of anti HCV antigen and 1121 samples were found to be seroreactive. Year wise prevalence remained <1% (ranging from 0.96% in 2012 to 0.86% in 2016. to and overall prevalence during 5 years was 0.72% as shown in table 1. Of the total 155275 blood donors, 143117 (92.17%) were males and 12158 (7.83%) were females. 105898 (68.2%) of donors were voluntary donors and the rest were replacement blood donors

To study the trend of HCV seropositivity during the study period Chi square for trend was employed. Trend of anti HCV positivity is depicted in figure-1. A steady linear decreasing trend was observed which was statistically significant. $P < .001$

DISCUSSION

The increasing public health importance of hepatitis C virus and wide variation of epidemiology across various parts of globe emphasizes the importance of prevalence studies of this disease. The disease is a challenge to Blood Transfusion Services all over the world because of its well reported transmission through blood and existence of a window period. Although blood donor population is asymptomatic and healthy subsection of general population, seroprevalence of hepatitis C or any other infectious marker in them may not be exactly reflective of the overall prevalence in general. This is because blood donors are selected using a well validated and comprehensive questionnaire which excludes those having known risk factors of transfusion transmitted hepatitis.

There have been various attempts to describe the trends in seroprevalence of Hepatitis C in asymptomatic blood donor

Year	Total no of Whole blood donations	Number of donors seroreactive for HCV	Percentage donors seroreactive for HCV
2012	28194	245	0.86%
2013	32423	292	0.9%
2014	32271	265	0.82%
2015	31367	183	0.58%
2016	31020	136	0.44%
Total	155275	1121	0.7%

Table-1: Frequency of seroreactivity for anti HCV antibody in whole blood donors from 2012 to 2016

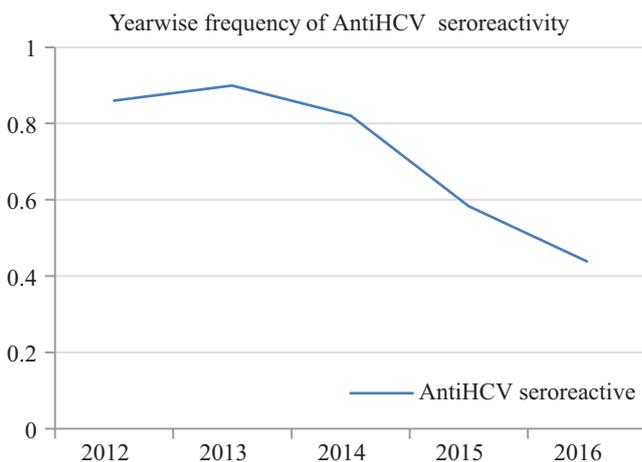


Figure-1: Trend of seroreactivity in asymptomatic donors over 5 years

population. A summary of significant studies done in India and other countries are shown in table 1, 2 and 3. Prevalence ranges in a range well below 2% (from 0.1 to 1.4) across different states of the country.⁵⁻¹⁶

On analysis of reports from various geographical areas on a similar time frame it is observed that individual prevalences reported by most of the Indian researchers are far less compared to reports from some neighbouring countries and from African continent.¹⁶⁻²⁴ Reports from Dhaka and other parts of Bangladesh indicate a prevalence of 1.7%.¹⁷ Studies from different geographical areas of Pakistan reports prevalence ranging from 2.65% to even 15%.^{18,19} Egypt is reported to have a high prevalence of 24.8%²⁰ in asymptomatic blood donors. Indonesia also has recorded a prevalence of 1.5%. It is also to be noted that this is in contrast with the low prevalence noted in US ranging from 0.4% to 0.8%.²⁵ A Chinese systematic review has reported a pooled prevalence of 0.334%.²²

While observing the trend in prevalence of HCV over 5 years, we found a slight but steady decreasing trend which was statistically significant (Chi square value 61, $P < .001$). Various other authors have also observed a decreasing trend in Hepatitis C.^{11,19,23,25} This decrease can be attributable to increase of public knowledge on transfusion-transmitted infections and improving of the safety measures employed in recent years. Notable changes which occurred in transfusion services past few years are mandatory screening all blood donors for HCV related high risks prior to donation and

State	province	Year of publication	author	Number of donors tested	Prevalence (%)
Tamil Nadu ⁵	Vellore	2012	Gowri v et al	1565	0.13
Karnataka ⁶	Tumkur	2016	Hulinaykar et	3378	0.82
Maharashtra ⁷	wardha	2012	Kumar A et al	28621	0.28
Telangana ⁸	Hyderabad	2014	Kumar et al	10582	0.2
Punjab ⁹	Ludhiana	2012	R Kaur	64528	1.4
Uttarpradesh ¹⁰	Lucknow	2016	Jahan et al	1991	1.2
Delhi ¹¹	Delhi	2013	Makroo et al	180477	0.4
Gujarat ¹²	Rajkot	2014	Dhruva et al	10788	0.07
Rajasthan ¹³	Ganganagar	2012	Sabharwal et al	13688	0.82
West bengal ¹⁴	Darjeeling	2012	Mondal et all	28364	0.62
Assam ¹⁵	Jorhat	2016	Rehman et al	27606	0.42

Table-2: Comparison of studies reporting prevalence of anti HCV in various states in India between 2012 and 2016

Country	Year	author	No of donors tested	Prevalence
Pakistan ^{16,17}	2010	khureishi et al	47043	4.87%
China ¹⁸	2010	Yongshui et al	559890	0.334
Bangladesh ¹⁹	2012	Huda et al	18481	0.01%
Ethiopia ²⁰	2016	Muhammed et al	4224	0.4%
Egypt ²¹	2015	Arthur et al	2644	24.8%
Nigeria ²²	2014	Alexander et al	1241	4.1%
Iran ²³	2013	Khodabandehloo	10739225	0.5%
Iraq ²⁴	2014	Hussein et al	7900	0.2%
USA ²⁵	2010	Murphy et al	959281	.072

Table-3: Comparison of studies reporting prevalence of anti HCV in various countries

application of strict questionnaire to potential donors. Application of uniform standards in questionnaire as well as employment of qualified counsellors have led to an effective donor selection program. There were many programmes for validation of counselling procedures and training across the country. Recent advances in Information technology has helped to maintain a data registry of blood donors with history of positive screening tests thereby avoiding their repeat donation. These factors also imply that prevalence in blood donors may not replicate the prevalence in general adult population.

There are a few reports of increasing prevalence of hepatitis C^{9,23,24} in the blood donor population (Table-3). This should not be ignored and multicentric studies with standardisation of donor counselling techniques and technologies should be undertaken to eliminate the differences across centres and establish the actual pattern.

CONCLUSION

Seroprevalence of Hepatitis C in asymptomatic blood donors after all screening measures stays well below 1% in the centre. Still there is a scope to further decrease the seroprevalence, employing a more stringent donor selection. Decreasing trend in past years is apparently promising, yet blood services should concentrate on enhancing detection technologies also as well.

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