

Trends in Prevalence of Hepatitis B (HBV) and Hepatitis C (HCV) virus infection among blood donors in Apollo Hospital, Dhaka, Bangladesh, 2007-2011

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Abstract

Transfusion transmitted infection (TTIs) is still a concern associated with blood transfusion as hepatitis B and hepatitis C remains a major public health problem in a country like Bangladesh. The trends of the prevalence of HBsAg and HCV infection among the healthy blood donors even in a tertiary level hospital could be a guide for planning and implementing programs for preventive measures.

All samples of a total 18,381 unit of blood were screened for hepatitis B surface antigen and anti-hepatitis C virus antibodies at Apollo Hospitals Dhaka over a period of 5 years (2007-2011). The prevalence of HBV and HCV infection was calculated by year to demonstrate the trends.

The overall sero prevalence rate of HBV and HCV among all blood donors at Apollo Hospitals, Dhaka during 2007 to 2011 was 1.42% and 0.10% respectively. There was decreasing trend observed in sero prevalence of HBV (1.77% vs 1.64%) and HCV (0.13% vs 0.02%) over five years of time, although this change was not statistically significant ($p=0.16$ for HBV and $p=0.20$ for HCV). However, a significant decreasing trend was observed in the sero prevalence of HBV among blood donors aged 30 years and above, which was 1.04% in 2011 against 1.73% in 2007 ($p=0.04$).

The decreasing trend in the prevalence of HBV and HCV infection might be the result of improvement in donor recruitment and selection, replacement donation exclusion in transfusion services, and possibly decreasing HBV infection prevalence in general population.

Introduction

The hepatitis B and hepatitis C are common blood borne infection causing high mortality and morbidity burden and thus constitute a major global health problem. Infection with HBV results in a wide spectrum of acute and chronic liver diseases and the epidemiological studies have clearly linked the virus with the development of hepatocellular carcinoma.¹ Hepatitis C virus infection on the other hand is highly associated with the development of liver cirrhosis.²

The Hepatitis B virus (HBV) is rapidly spreading in the developing countries including Bangladesh. It is 50 to 100 times more infectious than HIV and an important

occupational hazard for health workers.³ About 2 billion people worldwide have been infected with the virus and about 350 million live with chronic infection, making the virus one of the most common human pathogens and a significant public health issue worldwide and particularly in Asia (75%).^{3, 4} The virus is still the most clinically significant transfusion transmissible infection with a per unit risk of 1: 82,000.⁵

Evaluation of data on the prevalence of these transfusion transmitted infections (TTIs), specifically HBV and HCV, among blood donors permits an assessment of the occurrence of infections in the blood donor population and

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consequently the safety of the collected donations. It also gives an idea of the epidemiology of these diseases in the community.

Most of the studies conducted in Bangladesh are limited among the professional blood donors, drug addicts, commercial sex workers, or hospitalized patients.⁶⁻¹⁰ Professional blood donors were the substantial contributors in blood donation system till the year 2000. But after 2001, a gradual increasing trend in family blood donation practice (58 – 61%) has been observed.¹¹

The rapid spread of HBV and HCV infection and the changed scenario in blood donation practice has inspired us to depict the trends of the prevalence of HBsAg and HCV infection among the healthy blood donors, and to describe their socio-demographic background at Apollo Hospitals Dhaka in Bangladesh. Such information could be a guide for planning and implementing programs for preventive measures in Bangladesh.

Materials and method

The study was conducted at the department of Transfusion Medicine, Apollo Hospitals Dhaka, which is a 420-bed hospital providing tertiary level health care in Bangladesh. A total 18,381 unit of blood collected from voluntary and replacement donors over a period of 5 years (2007-2011) utilizing a standard protocol for blood donor recruitment, selection, rejection and laboratory procedure.

All samples were screened for hepatitis B surface antigen, anti-human immunodeficiency virus antibodies, anti-hepatitis C virus antibodies, and Venereal Diseases Research Laboratory (VDRL) reactivity. The total number of sero reactive cases and their distribution were noted and information on prevalence and

socio-demographic background of all the blood donors were collected from the donor's data and screening results recorded in computer.

Laboratory Methods:

Detection of hepatitis B surface antigen (HBsAg)

PATHOZYME-HBsAg is a third generation enzyme immunoassay (omega diagnostics), was used for the detection of hepatitis B surface antigen (HBsAg). Combined assay Sensitivity approximately 0.5ng/ml and sequential assay Sensitivity approximately 0.25ng/ml.

HCV

IgG antibodies to HCV were detected using an ELISA technique (Biorex anti-HCV 4th Generation). Polystyrene micro well strips were pre-coated with recombinant, highly immuno-reactive antigens from the NS5 regions of the viral genome in addition to NS3 (c200), NS4 (c200) and the core (c22) regions of HCV with a marked improvement in sensitivity. This involved two-step incubation procedure. During the first incubation step, anti HCV specific antibodies, if present, bound to the solid phase pre-coated HCV antigens. The amount of conjugate bound, and hence color, in the wells, is directly related to the concentration of antibody in the sample. When the test is run and results are interpreted according to manufacturer's instructions.

Analysis Plan

To define the prevalence of HBV and HCV infection, the number of positive donations for every year is divided by the defined number of blood donations for each year and was expressed as percentage. Chi-square analysis was performed between first and last year of study and considered significant if p value was <0.05.

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Results

A total of 18,381 donors were screened over a period of five years, January 2007 to December 2011. Males comprised most of the blood donors 17807 (96.1%) and female 574 (3.9%). Of the total, highest proportion (22%) of donors donated their blood in 2011, however, highest proportion (26.3%) of HBsAg cases were identified in 2007. The mean age of the blood donors was 31 years and the majority of blood

donors were in the age group 25 years to 34 years (55.4%). Almost all (99%) of the donation were by family members and friends for replacing the blood used for their patients. Majority (44.5%) of the blood donors were service holders. More than one third (36.5%) blood donors belonged to the O blood group and most of the donors (95.6%) were Rh positive. (Table 1 and Table 2)

Table1: Distribution of Blood donors at Apollo Hospitals Dhaka-a tertiary care hospital in Dhaka, Bangladesh.

Year	Donors			Number of positive cases	
	Male	Female	Total (%)	HBsAg	HCV
2007	3677	216	3893 (21.2)	69	5
2008	3185	89	3274 (17.8)	44	5
2009	3279	70	3349 (18.2)	37	4
2010	3707	108	3815 (20.8)	56	3
2011	3959	91	4050 (22.0)	56	1
Total	17807	574	18381 (100.0)	262	18

Table 2: Socio-demographic and other characteristics of Blood donors at Apollo hospitals, Dhaka-a tertiary care hospital in Bangladesh.

Characteristics	Number (n=18381)	Percents
Age group		
Less than 30 years	8527	46.4
30 years and above	9854	53.6
Female	574	3.1
Male	17807	96.9
Occupation		
Service	8186	44.5
Student	5292	28.8
Business	3653	19.9
Professionals	558	3.0

Characteristics	Number (n=18381)	Percents
Teachers	184	1.0
Household works	217	1.2
Others	291	1.6
ABO blood groups		
O	6706	36.5
A	4377	23.8
B	5689	30.9
AB	1609	8.8
Rhesus (RH) Type		
Positive	17575	95.6
Negative	806	4.4
Donor Type		
Replacement donor	18205	99.0
Voluntary donor	176	1.0

Trends of sero prevalence of HBV and HCV

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change was not statistically significant (p=0.16 for HBV and p=0.20 for HCV). However, a significant decreasing trend was observed in the sero prevalence of HBV among blood donors aged 30 years and above, which was 1.04% in 2011 against 1.73% in 2007 (p=0.04). (Fig1 and Fig 2)

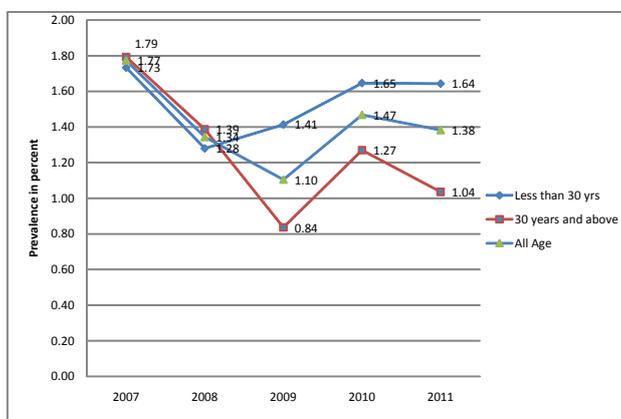


Fig 1: Trend in prevalence of HBV infection among blood donors at Apollo Hospitals Dhaka by age group.
(P value for < 30 yrs: 0.81, for 30yrs and above: 0.04, all age: 0.16)

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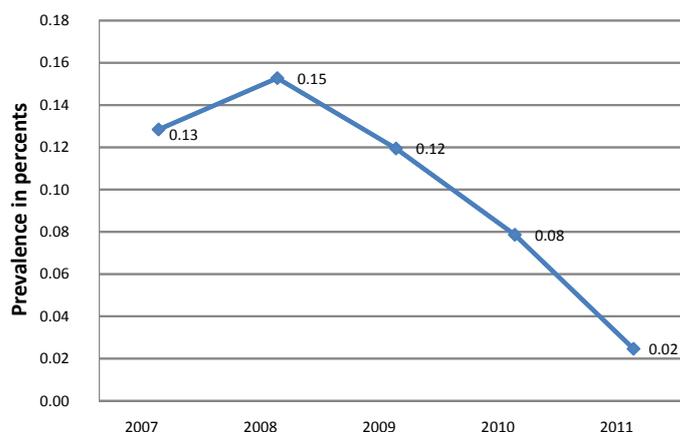


Fig 2: Trend in prevalence of HBV infection among blood donors at Apollo Hospitals Dhaka by age group.
($p=0.20$)

Discussion

Both hepatitis B virus (HBV) and hepatitis C virus (HCV) infection are a significant public health problem in the developing countries including Bangladesh due to the lack of health education, poverty, illiteracy and lack of universal hepatitis B vaccination programs. The Blood Transfusion Service in Bangladesh is basically a hospital based system where blood banks are responsible for the whole service, including the recruitment of donors, testing donated blood for infectious agents, preparation, storage and issue of components. Over the last few years the source of blood has shifted from the Professional Blood Donation System to the family Blood Donation System in Bangladesh. Currently the source of donated blood is a combination of non voluntary replacement donation by the family members and friends and a growing number of voluntary non remunerated donors through donor drives arranged by various non government student organizations. Screening the donor's blood for HBV, HCV, HIV, malaria and syphilis is a mandatory procedure for all government and non government blood transfusion centers essential for monitoring blood supply safety. Although not significant, the present study shows that the prevalence of HBV and HCV infection among healthy blood donors of Dhaka

city is on an overall decline from 1.77 in 2007 to 1.64 in 2011 and 0.13 in 2007 to 0.02 in 2011 respectively.

In consistency with our study, a statistically insignificant decreasing trend is observed among blood donors in HBV sero prevalence in New Delhi, India 2002 to 2005.¹² Similarly, a significant decreasing trend in sero prevalence of both HBV and HCV was reported by Emekdas et al in Turkey from 1989 to 2004.¹³

Another retrospective study among the blood donors in Ghana has also shown the decreasing trend of HBV and HCV infection during the year 2006 to 2008.¹⁴

There is an increasing trend of family blood donation practice in blood transfusion centers in Dhaka, and declining trend in prevalence of HBsAg and HCV infection among them exhibit safe blood transfusion practices especially in tertiary level hospitals. However, ignorance, illiteracy, poverty, urbanization, industrialization, socio cultural changes, poor infection control measures in health-care settings and unscreened blood transfusion practices are possible causes of HBV infection spread. Both the government and non government sectors must take some major steps in educating the masses, including

the youth, in schools, colleges, universities and working areas for better knowledge of such problems. Health screening in these areas along with the awareness programs and the government and non government organizations must strictly monitor the compulsory vaccination programs in the country in order to prevent further spread of HBV infection. A lot more should be done to decrease the possibility of transmission, thus enhancing human health.

The limitations of our study is that it is conducted in a group of population where males are mostly coming to donate blood and we did not do the confirmatory test for HBV and HCV though we have repeated the test using different company reagents.

Conclusion

The frequency of HBV infection entering the blood supply has decreased over this period as a result of improvement in donor recruitment and selection, replacement donation exclusion, in transfusion services and possibly decreasing HBV infection prevalence in general population.

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