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**Original Research Article****Prevalence of Hepatitis B and C in Blood Bank Donors in SVNGMC Yavatmal****Snehal Jumnake\***, Jayawant Mahadhani, Sanjay Khandekar, Nilima Lodha and Snehalata Hingway*Department of Pathology, Shri Vasantnao Naik Government Medical College, Yavatmal, Maharashtra, India- 445001*

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Yavatmal, Maharashtra, India- 445001**\*Article History:****Received:** 25/11/2017**Revised:** 28/11/2017**Accepted:** 29/11/2017**DOI:** <https://doi.org/10.7439/ijbr.v8i11.4494>**Abstract****Background:** Infections caused by the hepatitis B virus (HBV) and hepatitis C virus (HCV) are global public health problems. The safety of donated blood can be estimated by monitoring the prevalence of viral markers in the donor population. The present study was carried out in Yavatmal region of Maharashtra state, with an objective to determine the prevalence of HBV and HCV among blood bank donors.**Methods:** Over a period of three years (January 2014 to December 2016), a total of 33082 blood units were collected from healthy voluntary and replacement blood donors. The donated units were serologically screened for hepatitis B surface antigen (HBsAg) and antibody to hepatitis C virus (anti-HCV).**Results:** Out of total blood donors, 93.67% were males and 6.32% were females. HBsAg was positive in 284 (0.85%) of the blood units that were collected, the blood units with anti-HCV seropositivity had the lowest prevalence (n=9, 0.027%) and these prevalence being higher in males than females. The prevalence of HBsAg was highest in the year of 2015 (0.93%) compared to 2014 (0.85) and 2016 (0.78). There was decline in the prevalence of HCV infection has been observed, from 0.039% in 2014 to 0.016% in 2016.**Conclusion:** The study reveals that the decrease in HBV and HCV prevalence among blood bank donors in SVNGMC Yavatmal might be associated with the introduction of immunization programs, and an increased awareness of hepatitis B throughout the country.**Keywords:** Hepatitis B virus, Hepatitis C virus, Voluntary, Replacement, Hepatitis B surface antigen.**1. Introduction**

Transfusion of blood plays an important role in the supportive care of medical and surgical patients. Safe blood transfusions remain a challenge in resource-limited settings where blood-transmitted diseases are endemic. Globally, the most notable transfusion-related risks are human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) due to their high prevalence rates [1]. The risk of transmitting hepatitis through transfusions of blood and blood products has been known since 1950 [2,3].

In 1965, Blumberg reported on the discovery of the hepatitis B surface antigen (HBsAg) [4]. In 1970, Purcell identified the hepatitis B virus (HBV) [5]. The presence of antibodies against the hepatitis B virus core

(anti-HBc), in the absence of both the hepatitis B surface antigen (HBsAg) and the hepatitis B surface antibody (anti-HBs), is evidence of a chronic HBV infection, which remains detectable for life [6,7]. Usually, an HBV infection is diagnosed with the detection of HBsAg and anti-HBc in the serum or plasma of an individual [8,9]. However, hepatitis B is one of most common infectious diseases of the world infecting two billion people including an estimated 400 million chronically infected cases [10]. Individuals with chronic infection have a high risk of developing liver cirrhosis and hepato cellular carcinoma.

The hepatitis C virus (HCV) was discovered in 1989 as the major causative agent of non A and non B hepatitis [11]. The hepatitis C virus (HCV) is transmitted

via blood and blood products, both parenterally and through sexual contact [12]. It is another common chronic blood borne infection with an estimated 3.9 million persons infected with the virus and has a high rate of development of liver cirrhosis. Infection by Hepatitis B virus (HBV) and Hepatitis C virus (HCV) cause serious mortality, morbidity and financial burden and are thus a major global health problem [13].

In the early 1990s, the introduction of new and improved screening tests for transfusion-transmissible diseases led to remarkable improvements in the safety of the blood supply. The national testing guidelines indicate that all blood units must be screened for markers of transfusion-transmitted diseases (TTDs), including HBsAg, anti-HBc, anti-HBs (for all anti-HBc positive samples), anti-HCV, HIV I/II, HIV p24 antigen, and the human T-lymphotropic virus (anti-HTL I/II), in addition to using a serological test for syphilis and malaria. All blood component units with a positive TTD test must be screened in duplicate. There are very few studies available on prevalence of HBV and HCV in Yavatmal district, consequently, the prevalence estimates are too imprecise to give evidence-based recommendations for blood donor screening. The aim of the present study was to determine prevalence of hepatitis B and C in blood bank donors in SVNGMC Yavatmal.

## 2. Materials and Methods

The present study was conducted by a retrospective review of the profiles of 33082 blood units collected from voluntary and replacement blood donors from January 2014 to December 2016, at Shri V. N. Government Medical College and Hospital, in Yavatmal district of Maharashtra state. The blood donors were either voluntary none remunerated, or replacement donors. A voluntary blood donor is a person who donates blood voluntarily and does not receive payment, and who donates only for an internal sense of altruism, or community responsibility. A replacement donor, either a friend or family member of the recipient, is someone who donates blood to replace the blood that is used for a transfusion, to ensure a consistent supply. The selected donors were healthy according to their clinical histories, and physical examinations, and they fulfilled the suitability criteria for donation. A self-administrated questionnaire was completed by the donors; this questionnaire inquired about risk factors

for blood-borne viral transmission, and included a clinical examination to further assess eligibility based on the American Association of Blood Banks standards.

Sera of the collected samples (Total- 33082, 2092 females and 30990 males) were separated and kept at -80°C till use for screening.

### 2.1 Hepatitis B virus surface antigen (HBsAg) test:

Detection of HBsAg was done using commercially available Monolisa™ HBsAg ULTRA ELISA kit (BIO-RAD, Marnes-la-Coquette, France) for the detection of HBsAg in serum and plasma.

### 2.2 Confirmatory test for HBsAg positive units:

Blood units which were shown to be HBsAg positive or at border line were retested using HBsAg confirmation kit (DIA.PRO Diagnostic, Milano, Italy), a set of reagents for the confirmation of HBsAg positivity in human sera or plasma.

### 2.3 Anti-Hepatitis C virus antibodies (HCV-Ab) test:

Detection HCV-Ab was done using the commercially available Murex anti-HCV 4th generation (DiaSorin, S. P. A. UK Branch, Central road, Dartford DA1 5Lr, UK), an enzyme immunoassay for the detection of antibodies to hepatitis C virus in human serum or plasma.

### 2.4 Confirmatory test for Anti-HCV-Ab:

Positive and borderline HCV-Ab units were confirmed using the commercially available HCV confirmation kit (DIA.PRO), an enzyme immunoassay for the confirmation of HCV Ab positivity in human sera or plasma.

The screening of blood donors or donated blood for HBsAg and anti-HCV is mandatory thus blood donations from individuals who are found to be positive for any of the above infections were not done. Archived results from the hospitals blood bank was used for this study with approval from the hospital authorities and results were represented as number and percentage.

## 3. Results

Over a period of three years (January 2014 to December 2016), a total of 33082 blood units were collected, of which 9671 (29.23%) units from replacement donors and 23411 (70.76%) units from voluntary blood donors. Out of total prospective blood donors, 30990 (93.67%) were males and 2092 (6.32%) were females (Table 1).

**Table 1: Blood Donor categories of the study population over the study period by sex**

Blood Donors	2014		2015		2016		Total
	Males	Females	Male	Female	Male	Female	
Voluntary Blood Donors	6922	695	7172	542	7635	445	23411
Replacement Donors	2407	195	3105	142	3749	73	9671
Total	9329	890	10277	684	11384	518	33082

Detection of hepatitis B surface antigen (HBsAg) was done using commercially available ELISA kit. Of the 33082 donated blood, 284 cases were positive to HBsAg and 9 cases positive to anti-HCV.

Thus, the overall prevalence of HBsAg was 0.85%; also results showed that the blood units that were positive for HCV had the lowest prevalence (0.027%). The prevalence rate of HBsAg and HCV was relatively higher in males than females, (Table 2).

**Table 2: Screening of donated blood for HBsAg and anti-HCV**

Screening of donated blood	Positive	
	Males (30990)	Females (2092)
For HBsAg	284 (0.85%)	0 (0%)
For HCV	9(0.027%)	0 (0%)

Table 3 represents the prevalence of HBsAg and HCV infection from 2014 to 2016. The overall prevalence rate for HBsAg was highest in the year of 2015 (0.93%) as compared to 2014 (0.85) but decrease in 2016 (0.78). However, the overall prevalence of HCV was highest in 2014 (0.039) but decreased to 0.016% in 2016.

**Table 3: Overall prevalence of HBsAg and HCV infection from 2014 to 2016**

Years	Overall Prevalence			
	HBsAg		HCV	
	Voluntary Donors	Replacement Donors	Voluntary Donors	Replacement Donors
<b>2014</b> N=10219 (V=7617+R=2602)	63 (0.82%)	24 (0.92%)	4 (0.052%)	0 (0%)
<b>2015</b> N=10961 (V=7714+R=3247)	63 (0.81%)	40 (1.23%)	3 (0.038%)	0 (0%)
<b>2016</b> N=11902 (V=8080+R=3822)	54 (0.66%)	40 (1.04%)	2 (0.024%)	0 (0%)

#### 4. Discussion

The group of viruses (hepatitis A, B, C, D and E) that cause acute and/or chronic infection and inflammation of the liver gives rise to a major public health problem globally. Hepatitis B and C viruses are major causes of severe illness and death. The global burden of disease due to acute hepatitis B and C and to cancer and cirrhosis of the liver is high (about 2.7% of all deaths) and is forecast to become a higher ranked cause of death over the next two decades [14]. Among these infections, hepatitis B is a potentially life threatening liver infection and is a major global health problem, having most serious type of viral hepatitis. A vaccine against hepatitis B has been available since 1982. Hepatitis B vaccine is 95% effective in preventing infection and its chronic consequences, and is the first vaccine against a major human cancer. Hepatitis B virus can cause an acute illness with symptoms that last several weeks, including yellowing of the skin and eyes (jaundice), dark urine, extreme fatigue, nausea, vomiting and abdominal pain. Hepatitis B is endemic in China and other parts of Asia. Most people in this region become infected with the hepatitis B virus during childhood and 8–10% of the adult population is chronically infected. Liver cancer caused by hepatitis B is among the first three causes of death from cancer in men, and a major cause of cancer in women in this region [15].

In the present study, hepatitis B and C virus infections occurrence among blood donors in a SVNGMC Yavatmal was determined by serological methods and the results were compared to assess the trends in three

consecutive years, 2014, 2015 and 2016. The study documents high prevalence of HBV infection as compared to HCV infection. Due to the size of the present study population, the prevalence estimates are strong with narrow confidence limits. Although there was a gender bias in the main sample, the study demonstrated that gender was a risk variable, men having a higher risk of HBV infection than women.

The HBsAg seropositivity results observed in this study were considerably lower (0.85%) than those reported by Ayoola et al [16]. They reported 5.4% HBsAg seropositivity and presumed that the most important factor that is responsible for the decline in HBV infection was the introduction of the HBV vaccination in 1989 [17]. This decline in HBV infection could also be due to the greater awareness of HBV among blood donors. The distribution of HBV worldwide shows variations depending on geographical location. In China, 1.4% of blood donors were reported to be positive for HBV [18]. High rates of chronic infections were also found in the Indian subcontinent, as 2% to 5% of blood donors were estimated to be infected [19]. In Europe, the prevalence of HBV in blood donors ranged from 0% to 5.2%, and in the United States the prevalence ranged from 0.4% to 1.0% among blood donors [20,21]. In this study, the HCV seropositivity rate among the tested blood units was 0.027%. Considering the worldwide prevalence of HCV seropositivity in blood donors from the Americas was 0.072% [21], and in Europe it ranged from 0.02% to 3.03% [20].

The present study raises serious concerns regarding the safety of the blood supply in our rural communities where resources are hard to come by. The decreasing rate of positivity to HBV and HCV or both suggests that horizontal rather than vertical transmission is the major source of this endemicity [22]. In areas of low endemicity, transmission occurs primarily among young adults and there is an age effect on the prevalence of HBV and HCV infections [23]. Horizontal transmission of HBV and HCV have been related to age, socioeconomic conditions, socio professional status and risky behaviours such as sharing of bath towels, chewing gum, partially eaten candies, or dental cleaning materials, as well as biting fingernails in conjunction with scratching the backs of carriers [24,25]. It has been shown that the improvement of socioeconomic conditions may lead to a decreasing exposure to HBV and HCV infections [26] thus an increased risk of HBV and HCV infections might be related to an increased exposure to risk factors in conjunction with poor sanitary and socioeconomic conditions. The decreasing trend of HBV and HCV infections in our study population might be due to decreased exposure to risk factors in conjunction with improving sanitary and socioeconomic conditions. The fact that our study community is being educated through weekly radio health talk programmes on these diseases in terms of good life style practices such as having protected sex, not sharing razors and needles with other people among others are being adhered to.

Another possible reason might be the fact that screening of blood donors for HBsAg and anti-HCV does not totally eliminate the risk of HBV and HCV infection through blood transfusion since donors with occult HBV and HCV infection that lacked detectable levels of HBsAg and anti-HCV [27] were screened as negative. This emphasizes the need for a more sensitive and stringent screening algorithm for blood donations even in rural settings.

## 5. Conclusion

HBV and/or HCV infection(s) among blood bank donors in the study area is/are reducing; this decrease in HBV and HCV prevalence among blood bank donors in SVNGMC Yavatmal might be associated with the introduction of immunization programs, and an increased awareness of hepatitis B throughout the country.

The study suggested that the occurrence of these infections among the blood donors should be monitored carefully to further reduce the rates to ensure safer and more reliable blood for transfusion. Measures such as more sensitive techniques, education, sensitization and

vaccination must be carried out to ensure that people are well enlightened and protected from these infections.

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