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# HBV and HCV Infection among both Voluntary and Replacement Donors at a Tertiary Care Hospital

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## ABSTRACT

**Background:** Hepatitis B virus and Hepatitis C virus can cause acute and chronic or long lasting infection. Chronic infection due to HBV, HCV cause long term continuing virus replication may lead to progression to cirrhosis, liver failure and Hepatocellular carcinoma. **Aim:** The aim of the present study is to create awareness among community about HBV, HCV seroprevalence in blood donors. **Methods:** A retrospective study over a period of 5 years from January 2014 to December 2018 was conducted at Department of Pathology by collecting data from blood bank registers. All the data entered into spread excel sheet and the positive samples were calculated for seroprevalence. **Results:** The seroprevalence of HBV was highest among blood donors i.e., 1.82 % (1003/54937) followed by HCV 0.31 % (175/54937). All TTIs were predominantly observed in the age group of 18-30 years (70.2 %), followed by 31-40 years (24.5 %). **Conclusion:** Blood donors should be investigated carefully for these viruses to reduce the rate of parenteral transmission and also ensure safe, reliable blood for transfusion.

***Keywords:*** Blood Donors, HBV, HCV.

## INTRODUCTION

Worldwide, several hundreds of millions of people are being affected by hepatitis viruses; has become a major public health problem, this viruses cause serious mortality, morbidity and financial burden.[1] Hepatocellular carcinoma is one of the ten most common cancers worldwide. Hepatocellular carcinoma is closely associated with HBV and HCV among all types of viruses.

HBV is endemic in the human population and hyper endemic in many parts of the world. It is a small, enveloped; partially double stranded, relaxed circular DNA virus comes under Hepadnaviridae. It is a life threatening liver infection and it is a major global health problem. In the WHO Eastern Mediterranean Region, the WHO South-East Asia Region and the WHO European Region, an estimated 3.3%, 2.0% and 1.6% of the general population is infected, respectively.[2]

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Hepatitis C virus is a RNA virus comes under flaviviridae. HCV is of 6 genotypes at present and various subtypes with differing geographical distribution.[3] WHO estimated that in 2016, approximately 399 000 people died from hepatitis C, mostly from cirrhosis and hepatocellular carcinoma (primary liver cancer). Globally, an estimated 71 million people have chronic hepatitis C virus infection.[4] HCV is a leading cause of mortality and morbidity, primarily through the development of liver fibrosis and cirrhosis.[5]

In the past years, leading cause of HCV transmission is transfusion transmitted infection. Due to introduction of recent diagnostic tests for screening of Hepatitis C, the risk of transmission has been reduced in 1992. With the invention of PCR and other newer assays, the risk of TTIs has been drastically reduced.[6]

Hepatitis B virus and Hepatitis C virus can cause acute and chronic or long lasting infection; these viruses can transmit usually through blood, although various body fluids have been implicated in the spread of infection.[7]

Chronic infection due to HBV, HCV cause long term continuing virus replication may lead to progression to cirrhosis, liver failure and Hepatocellular carcinoma. A number of variants of these viruses have been described. Early diagnosis of these infections and accurate treatment of chronic

hepatitis can present or lower your chances of developing these complications.
The aim of the present study is to create awareness among community about HBV, HCV seroprevalence in blood donors.

## MATERIALS AND METHODS

A retrospective study over a period of 5 years from January 2014 to December 2018 was conducted at Department of Pathology by collecting data from blood bank registers. Blood donors were selected only if they fulfilled all the criteria to be eligible for donation as per blood bank policy. At Blood bank, routinely blood was collected from apparently healthy persons aged between 18-60 years, weight > 45 kg and hemoglobin of > 12.5 gm/dl.
All blood samples collected from donors were screened for HIV, HBV, HCV, Syphilis and malaria according to blood bank policy. Before drawing blood, donors were asked to fill pre structured Blood bank questionnaire and consent form.

**Inclusion criteria:**
Persons of both sexes of age group between 18-60 years, with a body weight of above 45 kg and hemoglobin concentration of >12.5 gm/dl.

**Exclusion criteria:**
Persons with significant medical and surgical history High risk patients including chronic diseases, professional blood donors, drug abusers, dialysis patients, pregnant women, patients treated in thalassemia clinics, sexually transmitted disease clinics, and sex workers.

**Blood collection procedure:**
Under aseptic precautions, venous blood was collected in plain vacutainer tubes, allowed to clot at room temperature and the tube was centrifuged at 2500 rpm for 5 minutes to extract serum for serological testing. Along with plain vacutainer, EDTA blood was also collected for testing hemoglobin and malaria. Quality controls were carried out routinely for all investigations according to manufacturer's instructions. Patient details were maintained confidentially.

**HBV testing:**
Microscreen HBsAg ELISA test kits (Span Diagnostic Ltd.,) were used for detection of HBsAg. The test is based on solid phase micro plate direct ELISA (Sandwich ELISA) technique. Indeterminate results were confirmed by rapid kits (J.Mitra & co.).

**HCV testing:**
SD HCV ELISA 3.0 (SD Bio-standard diagnostic Pvt., Ltd.,) kits were used which is indirect sandwich ELISA for the qualitative detection of antibodies against HCV. Indeterminate results were confirmed by rapid kits (J.Mitra & co.).

All the data entered into spread excel sheet and the positive samples were calculated for seroprevalence.

## RESULTS

In this present 5 years study, total number of blood donor population was 54937, among them voluntary donors were 33891 and replacement donors were 21046. Out of 33891 voluntary donors, 33486 (98.8%) were males and remaining 405 (1.19%) were females. All replacement donors (21046) were males [Figure 1].

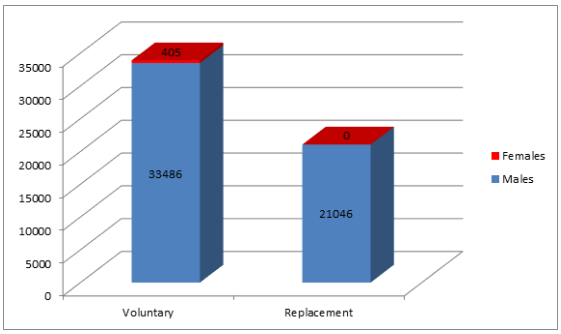


**Figure 1: Showing sex distribution among blood donors**

In 5 years of study, 1337 were Transfusion transmitted infections out of 54937 blood bank screenings. Out of 1337 TTIs, majority were Hepatitis B virus positive cases. The seroprevalence of HBV is highest, 1.82 % (1003/54937) followed by HCV 0.31 % (175/54937) in all the donors.
Among 1337 TTIs, 1003 (75.01%) were Hepatitis B virus, 175 (13.08 %) were Hepatitis C virus. All TTIs were predominantly observed in the age group of 18-30 years (70.2 %), followed by 31-40 years (24.5 %) [Table 1].

**Table 1: Seroprevalence of TTIs distribution in relation to age**

| Tests | Age group in years | | | | Total |
|---|---|---|---|---|---|
| | 18-30 | 31-40 | 41-50 | 51-60 | |
| HBV | 689 | 259 | 47 | 8 | 1003 |
| HCV | 131 | 35 | 8 | 1 | 175 |
| Total | 820 | 294 | 55 | 9 | 1337 |

## DISCUSSION

Viral hepatitis is not only a global health problem and also an occupational hazard among healthcare personnel. To avoid transmission of viruses at health care settings, health care personnel should adhere to infection control policies.
Both these hepatitis viruses results in long term health complications. Hepatitis B positive patients require treatment in certain situations like those with chronic hepatitis, cirrhosis, HCC, or HIV co-infection; patients receiving immunosuppressive treatments; and women in the third trimester of pregnancy who have elevated HBV DNA level [8].

In this present 5 years study, total number of blood donor population was 54937, among them voluntary donors were 33891 and replacement donors were 21046. Out of 33891 voluntary donors, 33486 (98.8%) were males and remaining 405 (1.19%) were females. All replacement donors (21046) were males. The seroprevalence of HBV is highest, 1.82 % (1003/54937) followed by HCV 0.31 % (175/54937) in all the donors. Our study findings are similar to various other studies [Table 2].

**Table 2: HBV and HCV seroprevalence among blood donors**

| Studies | Year | Area | HBV | HCV |
|---|---|---|---|---|
| Subhashish Das et al,[9] | 2006-2010 | Kolar, India | 0.92 | 0.22 |
| Pahuja S et al,[10] | 2007 | New Delhi, India | 2.23 | 0.66 |
| Chandra T et al,[11] | 2009 | Lucknow, India | 1.96 | 0.85 |
| Arora D et al,[12] | 2010 | Haryana, India | 1.7 | 1.0 |
| Srikrishna A et al,[13] | 1999 | Karnataka, India | 1.86 | 1.02 |
| Giri PA et al,[14] | 2009-2010 | Maharastra, India | 1.09 | 0.74 |
| Bhattacharya P,[15] | 2004-2005 | West Bengal, India | 1.46 | 0.31 |
| Present Study | 2014-18 | Southern Andhra Pradesh, India | 1.82 | 0.31 |

Few studies reported HBV seroprevalence among blood donors in lower levels by Adhikari et al,[16] Gupta N et al,[17] were 0.78%, 0.66% and few studies reported it to be in a higher level by Garg S et al,[18] as 3.44%, Mumtaz S et al,[19] as 5.86% and Dessie A et al,[20] as 25%.

In similar to our study, Garg S et al,[18] Singh B et al,[21] Chattoraj A,[22] Kaur H,[23] reported HCV seroprevalence of 0.28%, 0.50%, 0.79% and 0.78%. Few studies reported it to be higher levels of 1.98%,[24] 2.8%,[25] 6.21%.[19]

A Study from regional blood transfusion service of Nepal,[26] during the period of 2006 to 2007 reported that the seroprevalence rate of HBV was highest in the Banke (1.2%) followed by Biratnagar (0.87%) and Kaski (0.35%) ($P < 0.0001$). The seroprevalence of HCV was highest in the Morang (0.26%) followed by Kaski (0.16%) and Banke (0.11%) ($P > 0.05$).

A Stud from Ghana,[27] stated that the overall prevalence of HBV and HCV was 13.8% (95% CI: 11.4–16.4) and 9.4% (95% CI: 7.4–11.6) respectively in 2006.

A Study from Yemen,[28] among blood donors stated that out of the 469 participants, 24 [5.1%] were positive for HBsAg and 6 [1.3%] for anti-HCV. They did a study on risk factors association found that history of blood transfusion [OR = 22.8], dental treatment [OR = 3.6], cupping [OR = 3.9] and malaria infection [OR = 6.8] were significantly associated with being positive for HBsAg. HBV positivity [OR = 0.17] & HCV positivity [OR= 0.05] are less likely with history of blood donation, while those with history of blood transfusion were more likely to test positive [OR = 65.6].

For safe transfusion practices, vital components to be considered are screening of donated blood, quarantine of blood and blood products. All staff of laboratory should know the national blood transfusion policy and should always adhere to policy while conducting screening tests, releasing results and storage of blood and blood products. The assay selected for blood screening should be highly sensitive and specific. Pooling of samples and sequential screening is not recommended for a blood screening programme.

In hospital based blood banks, blood screening tests and facilities of blood donors should be separate from routine microbiology diagnostic testing facilities, as most of the diagnostic samples are generally taken from symptomatic patients; which are high risk samples.

In blood banks, separate blood storage equipment should be designated for unscreened units, screened units, reactive units, indeterminate units, units for clinical use and units for discard or nonclinical use.

Diagnostic procedures include HCV antibody testing, PCR for HCV RNA measurement, viral genotype and subtype determination and assessment of drug resistance associated strains. Some persons affected by viral hepatitis may not lead to acute fulminant hepatitis. Around 30% (15–45%) of infected persons spontaneously clear the virus within 6 months of infection without any treatment. There is no prophylactic vaccine for HCV. Now-a-days choosing a right drug including the NS3/4A protease, the NS5A protein and the RNA-dependent RNA polymerase NS5B protein helps to treat >90% of patients.[29]

Universal vaccination of HBV and development of accurate therapy to HBV and HCV infections helps to eliminate these infections.[30] A number of research studies have been investigating related to immune responses to these viruses, virus and host immunological approaches to eradicate HBV and HCV.

## CONCLUSION

In the present study, among both voluntary and replacement blood donors, seroprevalence of HBV is higher than hCV. Both HBV and HCV were predominantly observed in 18-30 years of age group. Best strategy to prevent Hepatitis B and to avert it's complications by universal vaccination of infants and adolescents. For HCV, pandemic can be controlled by effective and preventive strategies like screening programmes, global access to treatment, health education. Blood donors should be investigated carefully for these viruses to reduce the

rate of parenteral transmission and also ensure safe, reliable blood for transfusion.

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