International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

# Hospital based Sero Diagnostic Study of Hepatitis B Virus in a Tertiary Care Hospital

**Venkatesha D T [1], Gayathree L[2]**

[1]Professor and HOD, Department of Microbiology, Hassan Institute of Medical Sciences, Hassan, Karnataka, India

[2]Gayathree L, Assistant Professor, Department of Microbiology , Hassan Institute of Medical Sciences, Hassan, Karnataka, India

**Abstract**: ***Background: Hepatitis is an inflammation of the liver most often caused by a viral infection [1]. Of these viruses hepatitis B virus (HBV) and hepatitis C virus (HCV) infections account for a substantial proportion of liver diseases world wide. These viruses are responsible for liver damages ranging from minor disorders to liver cirrhosis and hepatocellular carcinoma (HCC). Objective: To study the serodiagnosis of Hepatitis B virus in a tertiary care hospital. Material and Method: The study group were the patients attending Sri Chamarajendra hospital, HIMS , Hassan Results ; In our study we found that the average percentage of positivity is 2.50%. It is the percentage which is seen in intermediate endemicity countries like India, South Asia, Eastern Europe, parts of Middle east and parts of South America. Conclusion: Hepatitis B is well known for its carrier state and also produces chronic liver disease and hepatocellular carcinoma. Strict screening of all the blood donors, pregnant mothers, drug abusers, organ donors is very important in prevention of spread of hepatitis B.***

**Keywords:** HBs Ag, HepatitisB, Screening, HCV, carrier

## 1. Introduction

Hepatitis is an inflammation of the liver most often caused by a viral infection [1]. Of these viruses hepatitis B virus (HBV) and hepatitis C virus (HCV) infections account for a substantial proportion of liver diseases worldwide. These viruses are responsible for liver damages ranging from minor disorders to liver cirrhosis and hepatocellular carcinoma (HCC). Type B hepatitis is the most wide spread and the most important type of viral hepatitis caused by hepatitis B virus(HBV). HBV is a complex 42 nm double shelled virus particle [2]. The outer surface of virus contains hepatitis B surface antigen (HBsAg)[3] . It encloses an inner icosahedral 27 nm nucleocapsid which contains hepatitis B core antigen (HBcAg). Inside the core is the genome, a circular double stranded DNA and a DNA polymerase.

Third of the world's population is estimated to be have been infected by Hepatitis B virus(HBV). About a quarter of them become HBV carriers. A quarter of these develop serious liver disease, including chronic hepatitis, cirrhosis and primary hepatic cancer. As there is an effective vaccine against HBV, hepatocellular carcinoma becomes the only human cancer which is vaccine preventable. The WHO estimates that HBV infection causes more than a million deaths a year worldwide.

## 2. Objective

This study was done to know the serodiagnostic positivity of Hepatitis B virus in Hassan, Karnataka, India.

## 3. Material and Methods

This study was conducted from January 2010 to April 2015 in the Department of Microbiology, HIMS, Hassan .The study group were the patients attending Sri Chamarajendra hospital, HIMS , Hassan .

## 4. Principle

The test done for the detection of HBsAg was the Bioline SD HBs Ag. This test is an in vitro immunochromatographic[4] one step assay designed for qualitative determination of HBs Ag in human serum or plasma. This test cassette contains a membrane strip which is pre coated with mouse monoclonal anti - HBs capture antibody on test band region . The Mouse monoclonal anti - HBs - colloid gold conjugate and serum sample moves along the membrane chromatographically to the test region and forms a visible line as the antibody – antigen – antibody gold particle complex forms.

**Sample Collection and Processing**

The study group were the patients attending the Sri Chamarajendra hospital, HIMS , Hassan, both inpatient and out patient were included. The blood sample was collected from clinically suspected cases of hepatitis B virus infection. The serum was used for the testing.

## 5. Procedure of the Test

1) Remove the test device from the foil pouch and place it on a flat dry surface.
2) Add 100 micro liter of specimen in to the sample well(S)
3) As the test begins to work, you will see purple color move across the result window in the center of the test device
4) Interpret test result at 20 minutes .
5) A positive result will not change once it has established at 20 minutes.

## 6. Interpretation of the Test

1) A color band will appear at left section of the result window to show that the test is working properly. This band is the control band.

2) The right section of the result window indicates the test result. If another color band appears at the right section of the result window this band is the test band.

**Negative result**
The presence of only one purple color band within the result window indicates a negative result.

**Positive result**
The presence of two color band ( T band and C band) within the result window, no matter which band appears first indicates a positive result

## 7. Result

In our study we found that the average percentage of positivity is 2.50%. It is the percentage which is seen in intermediate endemicity countries like India, South Asia, Eastern Europe, parts of Middle east and parts of South America. In our study we found that the sero prevalence of Hepatitis B virus is same as the other parts of India

| *Year* | *Total cases screened* | *Positive* | *Percentage* |
|---|---|---|---|
| 2010 | 4550 | 259 | 5.69 |
| 2011 | 7060 | 198 | 2.80 |
| 2012 | 18936 | 341 | 1.80 |
| 2013 | 26719 | 444 | 1.66 |
| 2014 | 27688 | 413 | 1.49 |
| 2015 | 6822 | 109 | 1.59 |
| Total | 91775 | 1764 | 2. 50 % |

## 8. Discussion

Hepatitis is an inflammation of the liver most often caused by a viral infection.[1] Of these viruses hepatitis B virus (HBV) and hepatitis C virus (HCV) infections account for a substantial proportion of liver diseases world wide. These viruses are responsible for liver damages ranging from minor disorders to liver cirrhosis and hepatocellular carcinoma (HCC). Type B hepatitis is the most wide spread and the most important type of viral hepatitis, [2] caused by hepatitis B virus(HBV). HBV is a complex 42 nm double shelled particle. The outer surface or envelope of virus contains hepatitis B surface antigen (HBsAg). It encloses an inner icosahedral 27 nm nucleo capsid, which contains hepatitis B core antigen (HBcAg). Inside the core is the genome, a circular double stranded DNA and a DNA polymerase. The genome is 3020 – 3320 nucleotides long( the full length strand) and 1700 – 2800 nucleotides long( the short length strand) [7]. The HBsAg gene is one long open reading frame but contains three in frame start(ATG) codons that divide the gene in to three sections pre –S1, pre –S2 and S, because of the multiple start codons, polypeptides of three different sizes called large, middle and small(pre –S1+pre S2 + S, pre –S2 + S or S) are produced [8]. The function of the protein coded for by gene X is not fully understood[9]. Several non –coding RNA elements have been identified in the HBV genome. These include HBV PRE alpha, HBV PRE beta and HBV RNA encapsidation signal epsilon [10,11].

Third of the world's population is estimated to be have been infected by Hepatitis B virus(HBV) [1]. About a quarter of them become HBV carriers. A quarter of these develop serious liver disease, including chronic hepatitis, cirrhosis and primary hepatic cancer. As there is an effective vaccine against HBV, hepatocellular carcinoma becomes the only human cancer which is vaccine preventable. The WHO estimates that HBV infection causes more than a million deaths a year worldwide.

As such there is no seasonal trend for HBV infection[6] and no high predilection for any age group, although there are definite high – risk groups such as parenteral drug abusers, institutionalized persons, health care personnel multiple transfused patients and staff, highly promiscuous persons and new born infants born to mothers with hepatitis B. Since mandatory screening of blood donors for HBsAg was instituted, the number of cases of transfusion associated hepatitis has been dramatically reduced. People have been infected by improperly sterilized syringes, needles or scalpels and even by tattooing or ear piercing. The estimated ratio of anicteric to icteric infections is reported to be as high as 4:1.

Other modes of transmission of hepatitis B exist. HBsAg can be detected in saliva, nasopharyngeal washings, semen, menstrual fluid and vaginal secretions as well as in blood. Transmission from carriers to close contacts by the oral route or by sexual or other intimate exposure occurs. There is a strong evidence of transmission from persons with subclinical cases and carriers of HBsAg to homosexual and heterosexual long term partners. There may be more than one billion virions per milliliter of blood from an HBeAg positive carriers and that the virus is resistant to drying, it should be assumed that all bodily fluids from HBV infected patients may be infectious. Sub clinical infections are common and these unrecognized infections represent the principal hazard to hospital personnel.

Health care personnel ( medical and dental surgeons, pathologists, other physicians, nurses, laboratory technicians and blood bank personnel) have a higher incidence of hepatitis and prevalence of detectable HBsAg or anti – HBs than those who have no occupational exposure to patients or blood products. The risk that these apparently healthy HBsAg carriers(especially medical and dental surgeons) represent to the patients under their care remains to be determined but is probably small.

Hepatitis B infections are common among patients and staff of hemodialysis units[6]. As many as 50% of the renal dialysis patients who contract hepatitis B may become chronic carriers of HBsAg compared with 2% of the staff group, emphasizing the differences in the host immune response. Family contacts are also at increased risk

Prevalence of HBV infection varies in different countries depending on the living standards of the people[5]. It is high in overpopulated developing countries, high endemicity with more than ( 8% carrier state) such as Africa, South East Asia, China, and parts of South America; whereas there is low endemicity in the developed countries with less than 2% carrier state ( Western Europe, North America, Australia) . Intermediate endemicity is observed in other areas( Eastern Europe, the middle East, South Asia and parts of south America) where carrier rate varies from 2 – 7 %. The

likelihood of becoming a carrier is higher in those persons who experienced a mild or sub clinical infection.

## 9. Conclusion

Hepatitis B is well known for its carrier state and also produces chronic liver disease and hepatocellular carcinoma. Strict screening of all the blood donors, pregnant mothers, drug abusers, organ donors is very important in prevention of spread of hepatitis B. Sterile precautions to be taken while using the syringes and other instruments. All the hospital staff to be screened for hepatitis B and all the staff should be immunized against hepatitis B. Tattooing and ear piercing should be done under aseptic precautions.

## 10. Recommendations

Strict screening of people for hepatitis B, strict sterile precautions are very important in prevention of spread of hepatitis B. Since hepatocellular carcinoma is the only vaccine preventable cancer and since effective vaccine is available for hepatitis B, vaccination should be done for all the health care professionals and high risk group people.

Since Hepatitis C virus(HCV) is also one of the major cause of Hepatitis, HBs Ag negative patient should be tested for Hepatitis C virus(HCV). All the HBs Ag positive cases in rapid card test method should be confirmed with Enzyme Linked Immunosorbent Assay (ELISA).

**Conflict of Interest**: Nil

**Ethical Issues:** Non interventional study. No ethical issues are involved.

## References

[1] Ayele. A.G, Selassie S. G, Prevalence and Risk Factors of Hepatitis B and Hepatitis C virus infections among atients with chronic liver diseases in Public Hospitals in Addis Ababa, Ethiopia**,** ISRN Tropical Medicine,Volume 2013 (2013):1-7
[2] Baveja .C.P, Hepatitis virus, Virology chapter, Textbook of microbiology, 4 th edition,2012:503
[3] Blumberg B.S, The discovery of Australian antigen and its relation to viral hepatitis. Vitro 1971;7;223.
[4] Sato K, Ichiyama S, Iinuma Y, Nada T, Shimokata K, Nakashima N. Evaluation of immunochromatographic assay systems for rapid detection of hepatitis B surface antigen and antibody, Dainascreen HBsAg and Dainascreen Ausab. J Clin Microbiol. 1996;34(6):1420–2
[5] Ananthnarayan R, Paniker.C.K.J, Hepatitis virus , Virology chapter, Textbook of Microbiology, 9 th edition ,editor Kapil A,2013:545
[6] Brooks, G. F., Carroll, K. C., Butel, J. S., & Morse, S. A. Jawetz, Melnick, Adelberg's Medical Microbiology., 24 th edition , 2007: 481
[7] Kay A, Zoulim F. Hepatitis B virus genetic variability and evolution. Virus Res . 2007;127(2):164–76.
[8] Beck J, Nassal M. Hepatitis B virus replication. World J Gastroenterol. 2007;13(1):48–64.
[9] Bouchard MJ, Schneider RJ. The enigmatic X gene of hepatitis B virus. J Virol. 2004;78(23):12725–34.
[10] Smith GJ, Donello JE, Lück R, Steger G, Hope TJ. The hepatitis B virus post-transcriptional regulatory element contains two conserved RNA stem-loops which are required for function. Nucleic Acids Res. 1998;26(21):4818–27.
[11] Flodell S, Schleucher J, Cromsigt J, Ippel H, Kidd-Ljunggren K, Wijmenga S. The apical stem-loop of the hepatitis B virus encapsidation signal folds into a stable tri-loop with two underlying pyrimidine bulges. Nucleic Acids Res. 2002;30(21):4803–11.