



## SIGNIFICANCE OF SEROPREVALENCE OF HEPATITIS B IN HIV POSITIVE PATIENTS

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**Abstract:** Study was undertaken to find out the significance of the co-infection of HBV/ HIV. HBV/HIV co-infection is a growing public health concern because both the diseases spread in a similar way. This co-infection has an increased risk of fibrosis and cirrhosis. Out of 256 samples 12 samples were positive for HBV i.e. 4.68% positivity. Highest prevalence was found among age group 36-45 years (50%), while not a single HBV positive case were recorded in less than 15 years of age. 6 out of 12 patients were between of 36-45 year of age, which implies that HBV infection is more common in adults. These observations will help the health professionals to deal better with HBV & HIV co-infected patients and will reinforces the need of prevention programs, which also lead to reduction in prevalence of HBV in HIV infected patients.

**Key Words:** Seroprevalence, HIV-HBV co-infection, cirrhosis, fibrosis

### INTRODUCTION

Acquired immunodeficiency syndrome's (AIDS) causative agent was first reported by Luc Montagnier and colleagues of the Pasteur institute, Paris in 1983. They called it lymphadenopathy associated virus (LAV). In 1986 the international committee on virus nomenclature gave a name human immunodeficiency virus (HIV), a member of family Retroviridae, subfamily Lentivirinae and genus Lentivirus.

Two antigenic types of HIV have been identified. HIV-1 represents the original LAV/HTLV-3. HIV-2 display only about 40% nucleotide sequence similarity (homology) with HIV-1, therefore, it is only weakly reactive with HIV-1 antiserum/HIV-2 is more closely related to Simian Immunodeficiency Virus (SIV) with which it has 75% homology.

Human immunodeficiency virus belong to class of Retro virus and sub family lentivirinae. It is rapidly mutating virus.

Viral Hepatitis is systemic disease with primary inflammation in the liver. There are six Hepatitis viruses i.e. Hepatitis A, B, C, D, E and G (Type F is proved to be a mutant of type B virus and not a separate entity. Type F was therefore deleted as a separate hepatitis virus). The infection caused by Hepatitis B is most severe and at times fatal. Hepatitis B viruses are also responsible for many cases of primary hepatocellular carcinoma.

The family Hepadnaviridae contains 5 hepatotropic viruses specific for man (HBV), woodchuck (WHV), ground squirrel (GSHV), duck

(DHBV) and heron (HHBV). All these viruses are highly species specific. Only HBV causes human infection.

This study was undertaken to find out significance of seroprevalence of Hepatitis B in HIV positive patient. Blumberg *et al.*, discovered Hepatitis B virus in 1965 in the serum of an Australian aborigine and thus its antigen is also called as Australian antigen.

Co-infection with HIV-HBV is a growing public health concern because the diseases spread in similar ways notably through shared use of needles to infected drugs and from mother to infant.

HIV/HBV co-infection has an increased risk of fibrosis and cirrhosis. Some studies found 3 to 6 fold risk of developing chronic hepatitis with HBV (Bodsworth, 1991; Hadler 1991) and 17 fold increase risk of death (Thio, 2002) in HIV/HBV co-infected patients as compare with HIV negative individuals.

The primary objective of HBV therapy is permanent eradication of the virus. The secondary potential benefit of eradication is a reduction in the risk of liver failure and liver cancer.

### Objectives of the study

1. To perform E/R/S (Elisa/ Rapid/Simple) test for HIV.
2. To determine the Seroprevalence of Hepatitis B (HBV) in HIV Positive patients.

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## MATERIALS AND METHODS

### Part A:

#### Tests for HIV confirmation

##### (i) ELISA

Sera was extracted from the blood of patients attending ICTC and was tested by ELISA kit.

##### (ii) COMB AIDS-RS Advantage

###### Principle

Dot immunoassay employs the same principle as Enzyme Immuno Assay (EIA), by the immobilised antigen-antibody complex as visualized by means of colour producing (chromogenic) reaction.

##### (iii) ONE STEP Anti-HIV (1 & 2) SD BIOLINE

###### Principle

The SD BIOLINE HIV-1/2 test is an immunochromatographic (rapid) test for the qualitative detection of antibodies of all isotypes (Ig G, Ig M and Ig A) specific to HIV-1 and HIV-2 simultaneously in human serum, plasma or whole blood.

##### (iv) TRI-DOT TEST FOR HIV

###### Principle

The HIV TRI-DOT test is a visual, Rapid, Sensitive and accurate immunoassay for the detection of HIV-1 and HIV-2 antibodies (IgG) in human serum or plasma using HIV-1 and HIV-2 antigens immobilized on a porous immunofiltration membrane. Sample and reagent pass through the membrane and are absorbed into underlying absorbent.

As the patient's sample passes through the membrane, HIV antibodies, if present, bind to the immobilized antigens to give distinct pinkish purple DOT against a white background.

### Part B:

#### Test for Hepatitis B

##### Rapid Test for Hepatitis B

##### One Step Hepatitis B Surface Antigen Test:

**Principle:** The SD BIOLINE HBs Ag Test is an in-vitro immunochromatographic, one step assay designed for qualitative of HBsAg 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 (T) and forms a visible line as the antibody-antigen-antibody gold particle complex forms.

The SD BIOLINE HBsAg test cassette has a letter of T and C as "Test Line" and "Control Line" on

the surface of the cassette. Both the Test Line and Control Line in result window are not visible before applying any samples. The Control Line is used for procedural control. The control line always appear if the test procedure is performed properly and the reagents of control line are working. The SD Bioline HBsAg can identify HBsAg in plasma or serum specimens with a high degree of sensitivity.

#### Modes of Transmission

HIV is transmitted by both homosexual and heterosexual contact by blood and blood products, and by infected mothers to infants either interpartum perinatal or via breast milk.

Hepatitis B disease caused by hepatitis B virus infects the liver of hominoidae, including humans, causes an inflammation called hepatitis. Originally known as serum hepatitis. Humans are the only reservoir of HBV.

#### Hepatitis B Carriers

There are two types of hepatitis B carriers: Super carriers and Simple carriers.

1. **Super carriers:** They have HBe Ag in blood and are highly infectious. Their blood contains high titre of HBs Ag and DNA polymerase. HBV may also be demonstrable in blood. Very minute amount of serum or blood can transmit the infection. These are called super carriers.
2. **Simple carriers:** They are more common type of carriers who have no HBeAg and low level of HBsAg in blood. HBV and DNA polymerase are absent. They transmit the infection only when large volumes of blood or serum are transferred, as in blood transfusion. These are named simple carriers.

#### Symptoms

- Acute infection with Hepatitis B virus is associated with acute viral hepatitis-an illness that begins with general ill health, loss of appetite, nausea, vomiting, body aches, mild fever, dark urine and then progresses to development of jaundice.
- The illness last for few weeks and then gradually improves in most affected people.
- A few patients may have more severe liver disease (hepatic failure) and may die as a result of it.
- Chronic inflammation of liver (chronic hepatitis) leading to cirrhosis over a period of several years.
- This type of infection dramatically increases the incidence of hepatocellular carcinoma.
- A fatal disease with very poor response to current chemotherapy.
- The infection is preventable by vaccination.

**Observations**

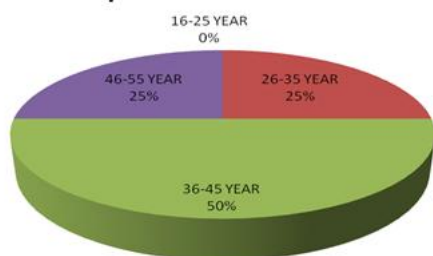
256 HIV positive samples were screened for HBV positivity. Out of which 12 samples were found positive with HIV/HBV co-infection.

**Table 1:** Prevalence of HBV in various Age group of HIV infected individuals.

Age group	Number	Percentage
16-25	0	0%
26-35	3	25%
36-45	6	50%
46-55	3	25%
>55	0	0%
Total	12	

12 samples were found to be positive for HBV out 256 samples so overall prevalence for HBV was 4.68%. Seroprevalence was highest in 36-45 years of age group.

**Prevalence of HBV Among In Various Age Groups HIV Infected Individuals**

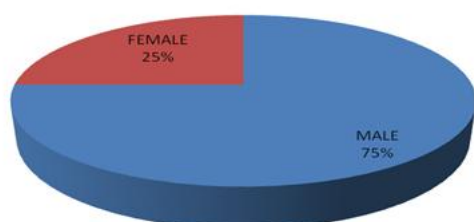


**Table 2:** Prevalence of HBV in different Sex groups

Gender	Number	Percentage
Male	9	75%
Female	3	25%

Prevalence of HBV among Male patients was found to be higher around 75%, in comparison to females i.e. around 25%.

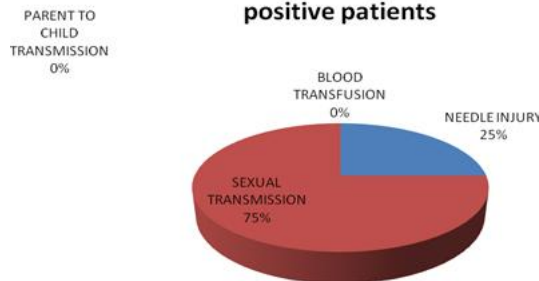
**Prevalence of HBV among Different Sex Group**



**Table 3:** Mode of Transmission of HBV among HIV positive patients.

Mode of Transmission	Number	Percentage
Needle injury	3	25%
Sexual Transmission	9	75%
Parent to child Transmission	0	0%
Blood Transfusion	0	0%

**Mode of Transmission of HBV among HIV positive patients**



**DISCUSSION**

HBV infection occurs virtually in every country of the world. The carrier rate in India is estimated to be 5%. Mild cases that do not result in jaundice are termed anicteric. Less than 1% of the icteric cases die of fulminant hepatitis, 90-95% recover with complete regeneration of the damaged liver within 2-3 months. The remaining patients progress to chronic active hepatitis, cirrhosis and hepatocellular carcinoma (HCC). HCC is one of the 10 most frequent tumors in the world, and there is considerable evidence that 80% are caused by chronic infection with HBV. Thus, the highest rates of HCC are found in areas where HBV is highly endemic and where infection occurs at a very early age. This is necessary as there may be interval of 30-40 years between infection and tumour development, although shorter intervals are seen. Hepatoma cells often contain HBV DNA, but the patient is usually negative for HBCAg and other indications of ongoing viral replication. Integration of HBV DNA fragments into the hepatocyte genome is a frequent event during HBV infection.

**HBV/HIV Co-infection**

**Epidemiology:** Co-infection with Hepatitis B (HBV) and HIV is common. Factors affecting the prevalence of chronic HBV include age at time of infection and mode of acquisition which vary geographically. In the United States and Western Europe, HBV often is acquired in adolescence or adulthood via sexual contact or injection drug use. Chronic HBV infection occurs in 5-10% of HIV infected individual who are exposed to HBV a rate of 10 times higher than that for the general population (Bodsworth N et al., 1987; Alter MJ 2006). In the United states HIV/HBV co-infection rates are highest among men who have sex with men (MSM) and injection drug users. There are approximately 350 million Hepatitis B carrier and about 33 million HIV infected people worldwide (WHO Guideline, 2008; UNAIDS, 2008). As the routes of transmission for these infections are similar, there is significant rate of co-infection in patients. Underlying HIV infection increases the chance of HBV chronicity (Benhamou Y., 2007). High rates of HBV infection are also seen in IDUs and therefore

HIV/HBV is relatively common in this group of patients (Opravil M et al., 1998).

#### **Impact of HIV on course of HBV infection**

Person with HIV and chronic HBV co-infection have higher levels of HBV DNA and lower rates of clearance of the Hepatitis B antigen (Hadler SC et al., 1991; Thio CL, 2003; Gilson RJ et al., 1997; Piroth L et al., 2007). Serum transaminase levels may be lower in HIV/HBV co-infected patients than in HBV mono-infected patients. HIV increases the rate of cirrhosis and end stage of liver disease in HBV co-infection. The risk of liver related mortality has been found to be 2-3 times higher in HIV/HBV co-infected patients than in HIV mono-infected patients. There are reports of patients clearing chronic HBV infection with the recovery of CD4 cell count responses following ART (Sheng WH et al., 2007; Mialhes P et al., 2007).

#### **Impact of HBV on the course of HIV disease**

Increased rate of HIV progression to AIDS among individuals with markers of exposure to HBV (Eskild A et al., 1992). Studies says progression is more rapid, with HIV positive patients with HBV infection, developing liver cancer in younger than patients with HBV infection alone (Bran N et al., 2007; Bodsworth NJ et al., 1991; Puoti M et al., 2006; Thio CL, 2009). In a very high levels of viral replication, HBV may have a direct cytopathic effect. Co-infection with HIV is generally accompanied by an increase in HBV replication (Piroth L et al., 2007) which might explain the evidence for an increased rate of progression to cirrhosis and death (Konopnicki D et al., 2005; Piroth L et al., 2007; Marcellin P et al., 2008; Weber R et al., 2006) when compared with HBV mono-infected patients.

#### **Hepatocellular carcinoma (HCC) screening**

Liver disease progresses more rapidly in HIV/HBV co infected patients and that HCC may be more aggressive in HIV co-infection (Puoti M et al., 2004). Many experts recommend HCC surveillance for all HIV infected patients with chronic HBsAg positive HBV disease. HBV is directly carcinogenic and may promote the development of HCC, especially in populations where HBV may have been acquired at birth or in early childhood (Bruix J et al., 2005). High HBV viral loads and low CD4 cell counts may be linked to the development of HCC.

#### **Management of HBV with HIV Co infection**

Patients with chronic HBV should be screened for Hepatitis C Virus (HCV) infection and should be vaccinated if they are not immune. HIV/HBV co-infected patients should be counselled to avoid or limit intake of Hepatotoxins including the alcohol.

#### **Prevention of HBV Transmission**

All HBs Ag positive patients should be counselled about reducing the risk of HBV transmission to the close contacts and those who share injection drug equipment with the patients should be screened for HBV and vaccinated if they are not actively infected. As with HIV prevention the use of condoms and avoidance of shared needles and equipment for injection drug use are recommended measures for reducing the risk of HBV transmission. Prevention strategies that work for viral hepatitis include immunization against HBV and education on safer sex for everyone and on harm reduction for IDUs. Safer blood and blood products and medical practices are also important.

#### **CONCLUSION**

From the high risk groups of the patients attending the HIV clinic JLN Hospital Ajmer, blood samples were collected and were screened for HIV, HBV co-infections

#### **HBV by strip test or ELISA**

Out of 256 samples 12 samples were positive for HBV i.e. 4.68% positivity. Highest prevalence among age group 36-45 years (50%), while not a single HBV positive case were recorded in age group <15 years. 6 out of 12 patients were between of 36-45 year of age, which implies that HBV infection is more common in adults.

We believe our data could help the health professionals to deal better with HBV & HIV co-infected patients and will reinforces the need of prevention programs, which also lead to reduction in prevalence of HBV in HIV infected patients.

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