

## Original Research Article

# Human immunodeficiency virus and HBV co-infection: independent entities, together by coincidence?

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## ABSTRACT

**Background:** To ascertain the prevalence of HBV among HIV-infected, treatment-naïve patients visiting a tertiary care centre in Jaipur, Rajasthan, India.

**Methods:** An observation analytic study was done at a tertiary care centre affiliated to medical college with retrospective analysis of the hospital data of 30 calendar months. During this period routine diagnostic screening of HIV infection and HBV infection was offered to every suspected patient admitted in hospital and every pregnant woman visiting antenatal care clinic. Patients with documentary evidence of HIV infection and history of Hepatitis B vaccination in last 30 days are not screened for these infections at our centre. The HIV screening was done as per NACO guidelines. The HBV screening was done using commercially available enzyme linked immunosorbent assay kits (ELISA) for detection of surface antigen (HBsAg).

**Results:** The study prevalence of HIV infection was 0.11% (40/35289). The prevalence was more in male (0.45%) than females (0.06%). HBV was not detected in any of the HIV positive patient in this study. The study prevalence of HIV among pregnant females was 0.05% (10/22026).

**Conclusions:** In this study, prevalence of HIV infection was 0.11%. The study prevalence of HIV among pregnant females was 0.05%. Other than pregnant women, maximum positive cases (13/30, 43.33% positive cases) were in the age group of 25-34 years (sexually active group). No patient had HIV and HBV co-infection.

**Keywords:** HIV infection, HIV-HBV co-infection, Pregnant female, Prevalence, Screening

## INTRODUCTION

Hepatitis B virus (HBV) infection shares common modes of transmission with HIV. Infected blood, unsafe injections and equipment's and unsafe sex are transmission modalities for both.<sup>1-2</sup>

HBV is 100 times more infectious than HIV.<sup>3</sup> Breast feeding is advised to the babies of HIV infected mothers but not to babies of HBV infected mother.<sup>4</sup>

HIV-HBV co-infection increases the morbidity and mortality beyond those caused by either infection alone.<sup>2,5</sup> People co-infected with HIV have higher levels of hepatitis B viremia, faster progression to chronic hepatitis B, cirrhosis and hepatocellular carcinoma, as compared to HBV infection alone.<sup>2</sup> The reported rate of undiagnosed HBV in HIV patients widely varies from as low as nil to as high as 89.5%.<sup>6-9</sup>

The HIV-HBV co-infection in pregnant women requires special attention. The screening of HIV and HBV

infection among pregnant women during early prenatal period enables the timely institution of measures to prevent their perinatal transmission.

Our center is a tertiary care center in north India where authors screen HIV reactive patients for hepatitis B surface antigen (HBs Ag). There is paucity of literature regarding HIV and HBV co-infection in general population. Therefore, this study was undertaken to determine the prevalence of HBV among HIV-infected, treatment-naïve patients.

## METHODS

The present study was an observation analytic study done at a tertiary care center affiliated to medical college in the capital city of Rajasthan, India. The hospital data of 30 calendar months (from 1<sup>st</sup> June 2016 to 30<sup>th</sup> November 2018) were analyzed retrospectively. During this period routine diagnostic screening of HIV infection and HBV infection was offered to every suspected patient admitted in hospital and every pregnant woman visiting antenatal care clinic. Patients with documentary evidence of HIV infection and history of Hepatitis B vaccination in last 30 days are not screened for these infections at our center.

Five ml of venous blood sample was collected from antecubital vein under all aseptic precautions from each eligible patient and was transported immediately to the laboratory for testing. In case of delay, serum sample was separated and stored in refrigerator at 2-8°C till further testing. Serum was separated in clean test tubes after clotting via centrifugation. The HIV screening was done using commercially available HIV 1+2 Immunodot test kit (COMBAIDS) (COMBAIDSARKRAY Healthcare Pvt. Ltd, India) based on rapid ELISA, for detection of HIV antibodies in the institutional premises, after consent of the patient and according to NACO guideline.<sup>10</sup> The person performing the test was blinded to the clinical state of the patients. When the serum sample was found positive for HIV antibodies then the same sample of the concern patient was further tested by the different principle based rapid test i.e. MERISCREEN HIV 1-2 WB (Immuno chromatography) and signal HIV immunodot test kit (Immuno filtration) as per NACO guideline.<sup>10</sup>

Among all HIV positive cases, HBV screening was done using commercially available enzyme linked immunosorbent assay kits (ELISA; Trustwell, Athenese-Dx Pvt. Ltd, India) for detection of surface antigen (HBs Ag) in institutional premises, after consent of the patient and according to manufacturer's instructions. When the serum sample was found positive for HBs Ag then the patient was labelled as HBV infected.

## RESULTS

In this study, 40 out of 35289 patients were found positive for HIV. Thus, the prevalence of HIV infection was 0.11%. The prevalence was more in male (22/4913 i.e. 0.45%) than female (18/30376 i.e. 0.06%) (Table 1).

**Table 1: Seroprevalence of HIV among study population.**

Sex	Positive		Negative		Total	
	N	%	N	%	N	%
Male	22	0.45	4891	99.55	4913	100
Female	18	0.06	30358	99.94	30376	100
Total	40	0.11	35249	99.89	35289	100

HBV was not detected in any of the HIV positive patient in this study. The study prevalence of HIV among pregnant female was 0.05% (10/22026). HBV was not detected in any pregnant women, so HIV-HBV co-infection was not found in this study among pregnant women.

**Table 2: Seroprevalence of HIV among female subjects.**

	Positive		Negative		Total	
	N	%	N	%	N	%
Pregnant	10	0.05	22016	99.95	22026	100
Non-pregnant	8	0.10	8342	99.90	8350	100
Total	18	0.06	30358	99.94	30376	100

The study prevalence of HIV among non-pregnant female was 0.10% (8/8350). The study prevalence of HIV among total female was 0.06% (18/30376) (Table 2).

**Table 3: Age wise distribution of study population (excluding pregnant women).**

Age(years)	Male				Female				Total			
	HIV positive		Total		HIV positive		Total		HIV positive		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
≤14	1	4.55	282	5.74	0	0	187	2.24	1	3.33	469	3.54
15-24	2	9.09	792	16.2	2	25	1440	17.24	4	13.33	2232	16.83
25-34	10	45.45	774	15.75	3	37.5	1982	23.73	13	43.33	2756	20.78
35-49	5	22.72	1018	20.72	2	25	2235	26.77	7	23.33	3253	24.53
≥50	4	18.18	2047	41.66	1	12.5	2506	30.01	5	16.67	4553	34.33
Total	22	100	4913	100	8	100	8350	100	30	100	13263	100

After exclusion of pregnant women, maximum positive cases (13/30,43.33% positive cases, 10 male and 3 female) were in the age group of 25-34 years (sexually active group) and minimum positivity (1/30 case, 3.33%, 1 male) was found in children ( $\leq 14$  years age). Seven (5 male and 2 female), 5 (4 male and 1 female) and 4 (2 male and 2 female) cases were found in 35-49 years,  $\geq 50$  years and 15-24 years age group respectively (Table 3).

Among pregnant women (22026 total), all cases of HIV (10 cases) were found between age of 20-34 years (5 cases in 20-24 years, 5 cases in 25-34 years age). Though the number of pregnant women were 1253, 10161, 10012 and 600 in 15-19 years, 20-24 years, 25-34 years and  $>35$  years age group respectively (Figure 1).

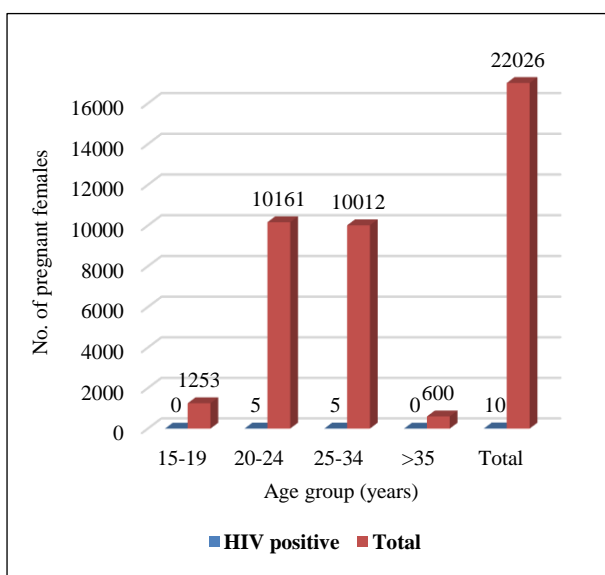


Figure 1: Age wise distribution of pregnant women.

## DISCUSSION

In last two decades significant advances have taken shape in the world of virology, namely HIV, HBV and HCV. Stupendous success has been achieved in systemic therapies of all three viruses. The HIV and HBV/HCV co-infection is of importance as HIV adversely affects the progression of HBV and HCV infection.<sup>11-15</sup> The infectivity of HBV/HCV is higher, and the hepatic morbidity is also more with HIV co-infection.<sup>16</sup>

Our tertiary care hospital has access to laboratory determinants of virology status of general/selected population, credit goes to the meticulous record keeping of the hospital. This functional advantage gave us the opportunity to analyze a large sample size. i.e. 35289 of HIV and 32772 of HBV screening done in last 30 months.

In present study of 35289 individuals, 40 were found to be HIV positive (0.11%) and majority were males which

is in accordance with other studies in Indian context.<sup>17,18</sup> As estimated in 2012, the adult prevalence in the general population in India was 0.27 percent.<sup>19</sup> The age group most commonly affected is the 20-34 years which is sexually active young group and is also in echo with previous studies.<sup>17,18,20-22</sup>

Due to several common features in the modes of transmission of these three virus illnesses (HIV, HBV, HCV), one is inclined to believe that these diseases could exist together in an individual. What authors found was contradictory to the above assumption. In present study, HIV-HBV co-infection was not found. The prevalence of co-infection varies according to the geographical difference and the modes of transmission.<sup>23</sup> The prevalence of HIV-HBV infection was found to be high when the mode of transmission is by intravenous drug use. This may explain a much higher prevalence of co-infection in western studies as well as from those parts of India where the main route of transmission of HIV was intravenous drug abuse.<sup>23,24</sup>

On scanning the literature, authors found that the studies of our magnitude were done by McKee G et al, over a span of 33 years (N=1376989).<sup>25</sup> They found that 94.1% of their study subjects did not have any of the three viral infections. They concluded that social practices, poverty and sexual behavior determined HIV infection with either HBV or HCV co-infections. In their study, HIV infection (alone or with HBV, HCV co-infections) was found in 0.8% (11025/1376989) individuals, HIV mono-infection was found in 0.41% (5716/1376989) individuals, HBV-HIV co-infection was observed among 0.05% (670/1376989) individuals, HBV-HIV-HCV triple infection among 0.08% (1180/1376989) individuals and HIV-HCV co-infection among 0.26% (3459/1376989) individuals. Their study included IV drug users.

In present study, prevalence of HIV among pregnant women was 0.05% (10/22026). In a single center study from north India, the prevalence of HIV was 0.84% among pregnant women.<sup>26</sup>

During the last two decades these three viral illnesses (HIV, HBV, HCV) have contributed immensely to the understanding of body defence. Also, research study conclusion for one viral disease has helped in understanding and combating the other viral disease. By the year 2030, these viral menaces have to be tackled in full measures.<sup>27</sup> It is well known that HIV, HBV and HCV profoundly affect the immune system of an individual. HIV affects the adaptive immunity while HBV and HCV affect the innate immunity. Response of the immune system to the viral attack may be synergistic or antagonistic, this remains to be elucidated.

The limitations of this study are few. This study was done at a tertiary care center with limited study population and the duration. A multicenter, long duration study with large sample size is required to validate the results across

the state or country. The current study definitively has built a platform for such larger studies.

## CONCLUSION

In this study, prevalence of HIV infection was 0.11%. The study prevalence of HIV among pregnant females was 0.05%. Other than pregnant women, maximum positive cases (13/30, 43.33% positive cases) were in the age group of 25-34 years (sexually active group). No patient had HIV and HBV co-infection.

This study aids in view to strengthen proper screening for HIV and HBV infection.

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