

## Seroprevalence of Hepatitis B Virus Surface Antigen (HBsAg) in the Patients Visiting Teaching Hospital of Jumla, Nepal

\*Bibek Pun Magar<sup>1</sup>, Nireesh Thapa<sup>2</sup>, Elisha Rana<sup>3</sup>, Keshav Raj Joshi<sup>4</sup>, Arjun Prasad. Tiwari<sup>5</sup>

<sup>1</sup>Lecturer, Department of Clinical Biochemistry, <sup>2</sup>Associate Professor, Department of Emergency Medicine and General Practices, <sup>3</sup>Nursing Officer, <sup>5</sup>Medical Officer, Department of Anesthesiology and Critical Care; Karnali Academy of Health Sciences Teaching Hospital, Jumla, Nepal, <sup>4</sup>Laboratory Scientific Officer, Krown Laboratory, Kathmandu, Nepal

\*Corresponding Author: Bibek Pun Magar, Email: bibekpunmagar9@gmail.com

### ABSTRACT



**Background:** Hepatitis B Virus (HBV) infection is a foremost global health problem. In the context of Nepal, the prevalence of HBV infection is found to be low, 0.9% (1.1% in males and 0.5% in females), though a high prevalence of  $\geq 8\%$  is shown among the population in the mountainous region by several studies. The epidemiology of HBV infection in the population of Jumla is not well-known. This study aimed to find out the seroprevalence of HBV surface antigen (HBsAg) in patients visiting Karnali Academy of Health Sciences Teaching Hospital (KAHS-TH), Jumla, Nepal.

**Methods:** The cross-sectional study was conducted in people visiting KAHS-TH, Jumla for testing HBsAg from 1st April 2018 to 31st March 2019. The samples collected were tested for HBsAg by using the Rapid HBsAg test kit. All positive cases were further tested by the Chemiluminescence (CLIA) method for HBsAg. The data entry was done in Microsoft Excel. After transferring the data into SPSS version 16, data analysis was done.

**Results:** In this study, 1704 individuals were screened during the period. Overall 53 (3.11%) were HBsAg positive. Among the total of 506 males and 1198 females, 22 (4.34%) males and 31 (2.58%) females were positive for HBsAg. The highest prevalence (8.1%) was observed in the age group of 40–45 years. But the prevalence rate is zero in 0–5 years age group and above 65 years of age.

**Conclusion:** The HBV infection was higher in Jumla as compared to that of the overall prevalence of Nepal. Males were highly infected than females and the middle age group was at the high-risk of HBV infection.

**Keywords:** HBsAg infection, Hepatitis B virus, High-risk group, Rural area, Seroprevalence

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## INTRODUCTION

Hepatitis B is a viral infectious disease caused by the Hepatitis B virus (HBV) which infects the liver and can cause both acute and chronic diseases.<sup>1</sup> HBV is a member of the Hepadnaviridae family. HBV is a DNA virus (42nm in size) with an outer envelope and an inner core enclosing the viral genome and a DNA polymerase enzyme.<sup>2</sup> The incubation period of HBV ranges from 30 to 180 days.<sup>3</sup> Most people with chronic infection can face serious, even life-threatening health issues like cirrhosis or liver cancer.<sup>4</sup>

HBV is transmitted by exposure to infected blood or body fluids and most commonly spread from infected mother to child at the time of birth. It is also spread by needlestick injury, sexual intercourse, blood transfusion, dialysis, tattooing, and piercing.<sup>1</sup>

HBV infection is a global health problem causing an estimated 1.34 million deaths in 2015 worldwide. Most hepatitis-related mortality (720,000) was because of liver cirrhosis, followed by primary liver cancer that is hepatocellular carcinoma (470,000 deaths).<sup>5,6</sup> Worldwide, an estimated 257 million people were living with chronic HBV infection in 2015. In general population, the global prevalence of HBV infection was 3.5%.<sup>7</sup> The infection has been preventable by vaccination since 1982. About a third of the world population has been infected at one point in their lives.<sup>1</sup> As of 2017, at least 5% of the world's population or 391 million people, had chronic HBV infection. However, another 145 million cases of acute HBV infection occurred that year.<sup>8</sup> Each year, above 750,000 people die of HBV<sup>1</sup> and nearby 300,000 of these are due to liver cancer.<sup>9</sup>

The HBV prevalence is believed to be heterogeneous in the general population of Nepal. However, there is no illustrative survey or study to confirm the national prevalence among adults.<sup>10,11</sup> Also, there are limited data on HBV prevalence in the general population of Nepal. In Nepal, the introduction of worldwide HBV vaccination has effectively decreased the HBV prevalence to 0.9% (1.1% among males and 0.5% among females).<sup>12</sup> Therefore, the objective of this study was to find out the seroprevalence of HBV surface antigen (HBsAg) in patients visiting Karnali

Academy of Health Sciences Teaching Hospital (KAHS-TH) Jumla.

## MATERIALS AND METHODS

This was a cross-sectional study and data collection was done at HBV screening time using a standardized data collection tool managed by trained health care providers. This campaign was conducted during the period of 1<sup>st</sup> April 2018 to 31<sup>st</sup> March 2019. All patients who visited KAHS-TH for testing HBsAg were included in the study. All participants who attended the health care center were screened for HBsAg after receiving verbal consent and for children below 18 years of age verbal consent was obtained from their respective guardians.

A standard chart was prepared for collecting demographic and laboratory data. Trained health care workers examined the registered files of participants to match the collected data from the participants. Blood samples collected for HBV screening were tested for HBsAg by a rapid HBsAg test kit in KAHS-TH by experienced laboratory technicians. Furthermore, all samples positive for HBsAg were referred to Krown Laboratory and Referral Center, Kathmandu for confirmation by using the Chemiluminescence (CLIA) method.

Demographic characteristics like age, gender, and the month of testing are independent variables and HBsAg seropositivity is a dependent variable. Data were entered using Microsoft excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 16. The result was presented by percentages and explanations using tables and figures.

Ethical approval was obtained from the Ethical Review Committee of KAHS-TH, Jumla. Before blood sample collection, informed verbal consent was taken from all eligible participants to HBV screening.

## RESULTS

The study was conducted on a total of 1704 individuals out of which, 1198 (70.3%) are female and 506 (29.7%) are male participants. Demographic characteristics with different age groups showed the highest number of participants i.e. 459 was found in the age group of 20 – 25 years followed by 358 in 15

– 20 years, and 211 in 25 – 30 years showing active youth participation for HBV screening (Table 1).

**Table 1: Demographic characteristics with different age groups (N=1704)**

Age group in years	Male N (%)	Female N (%)	Total (N)
0 – 5	28 (43.75)	36 (56.25)	64
5 – 10	29 (44.61)	36 (55.38)	65
10 – 15	41 (41.41)	58 (58.58)	99
15 – 20	68 (18.99)	290 (81.0)	358
20 – 25	92 (20.04)	367 (79.95)	459
25 – 30	67 (31.75)	144 (68.24)	211
30 – 35	38 (34.54)	72 (65.45)	110
35 – 40	29 (43.28)	38 (56.71)	67
40 – 45	24 (47.05)	27 (52.94)	51
45 – 50	33 (44.59)	41 (55.40)	74
50 – 55	17 (39.53)	26 (60.46)	43
55 – 60	14 (43.75)	18 (56.25)	32
60 – 65	12 (30.76)	27 (69.23)	39
65 – 70	10 (38.46)	16 (61.53)	26
70 – 75	3 (75.0)	1 (25.0)	4
75 – 80	1 (50.0)	1 (50.0)	2
Total	<b>506 (29.7)</b>	<b>1198 (70.3)</b>	<b>1704</b>

Fig 1 illustrates that out of 1704 participants enrolled, 53 of them tested positive for HBsAg. Among total 506 (29.7%) males, 22 (4.3%) tested positive and among 1198 (70.3%) females, 31 (2.5%) female tested positive for HBsAg.

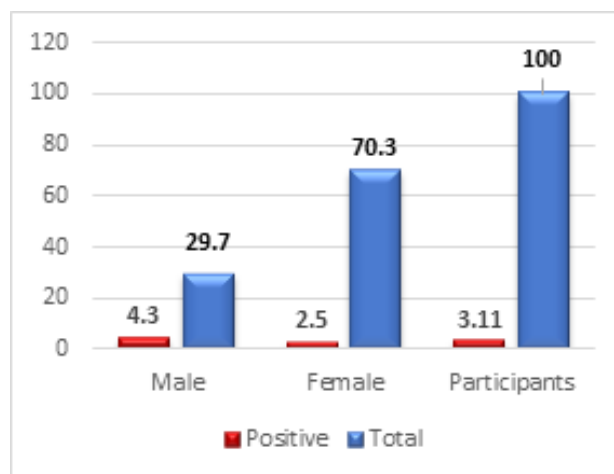


Figure 1: Gender wise distribution of HBV infection

The highest HBsAg seropositivity rate was found in the age group of 45 – 50 years with 8.10% followed by 60 – 65 years (7.69%) and 30 – 35 years (4.54%) while the age group of 0 – 5 years and above 65 years shows seropositive for HBsAg seronegative. The overall male prevalence rate for HBsAg positive was 4.34% in which the highest prevalence rate of 16.66% was seen in the age group of 60 – 65 while age groups below 10 years and above 55 years didn't show any incidence of HBV infection. Similarly, in the case of females, the prevalence rate was found to be 2.58% and the highest prevalence rate of 6.25% was seen in the age group of 65 – 70 years followed by 5.55% in the age group of 55 – 60 years and 4.87% in the age group of 45 – 50 years while in the age groups below 5 years, above 40 years to 55 years, and above 70 years didn't show any incidence of HBV infection (Table 2).

**Table 2: HBsAg seropositivity among males and females according to different age groups**

Age Group in year	Male		Female		Total Positivity (%)
	N	HBsAg +ve (%)	N	HBsAg +ve (%)	N
0 – 5	28	0	36	0	0
5 – 10	29	0	35	1 (2.85)	1.56
10 – 15	41	2 (4.87)	58	1 (1.72)	3.03
15 – 20	68	1 (1.47)	291	6 (2.06)	1.94
20 – 25	92	4 (4.34)	367	11 (2.99)	3.26
25 – 30	67	2 (2.98)	144	4 (2.77)	2.84
30 – 35	38	3 (7.89)	72	2 (2.77)	4.54
35 – 40	29	1 (3.44)	38	1(2.63)	2.98
40 – 45	24	2 (8.33)	27	0	3.92
45 – 50	33	4 (12.12)	41	2(4.87)	8.10

50 – 55	17	1 (5.88)	26	0	2.32
55 – 60	14	0	18	1(5.55)	3.12
60 – 65	12	2 (16.66)	27	1(3.70)	7.69
65 – 70	10	0	16	1(6.25)	3.84
70 – 75	3	0	1	0	0
75 – 80	1	0	1	0	0
Total	<b>506</b>	<b>22 (4.34)</b>	<b>1198</b>	<b>31 (2.58)</b>	

From April 2018 to March 2019, a respective number of participants visited KAHS-TH for HBsAg screening. We found the highest number of participants during the winter season 13.08%, 12.91% and, 12.79% in December, February, and March respectively while a low number of individuals participated during summer with 4.46%, 4.69%, and 4.87% in August, May, and July respectively (Table 3).

**Table 3: Rate of participants visited the hospital for HBsAg screening during different months**

Months	Male N (%)	Female N (%)	Total N (%)
April	42 (33.60)	83 (66.40)	125 (7.34)
May	26 (32.50)	54 (67.50)	80 (4.69)
June	34 (36.95)	58 (63.04)	92 (5.39)
July	20 (24.09)	63 (75.90)	83 (4.87)
August	21 (27.63)	55 (72.36)	76 (4.46)
September	26 (26.80)	71 (73.19)	97 (5.69)
October	39 (32.23)	82 (67.76)	121 (7.10)
November	56 (29.78)	132 (70.21)	188 (11.03)
December	75 (33.63)	148 (66.36)	223 (13.08)
January	47 (25.96)	134 (74.03)	181 (10.62)
February	59 (26.81)	161 (73.18)	220 (12.91)
March	61 (27.98)	157 (72.01)	218 (12.79)
Total	<b>506 (29.70)</b>	<b>1198 (70.30)</b>	<b>1704</b>

## DISCUSSION

The study showed the prevalence of HBsAg seropositivity (3.11%) in KAHS Teaching Hospital, Jumla, a hilly/mountainous region of Karnali provenance of Nepal. This rate was much higher than the overall rate of Nepal (0.9%) but lower than the prevalence of the world (3.5%)<sup>7</sup> and also very much lower than other hilly and mountain region of Nepal, 6.6% in Surkhet, 17% in Dolpa as shown by various studies.<sup>10,13</sup> In a study done in Kathmandu city of Nepal by Bhatta et al, showed the prevalence rate of 4.19% which was a little higher than our study.<sup>14</sup>

In our study, only 506 (29.7%) males participated as compared to females 1198 (70.3%) which shows the deep root of illiteracy and lack of public awareness in the society. Males had a higher prevalence rate (4.34%) as compared to female participants (2.58%). In this study, male sex was one of the demographic characteristics related to HBsAg positivity. A similar association of male sex with HBV infection was also found in different studies from Pakistan, Rwanda, South Africa.<sup>15-17</sup> But in our study, the number of male participants was much lower which needs special attention in future programming to focus on males to participate voluntarily in such a study.

Very young 0-5 years and very old > 70 years age groups had zero prevalence rates of HBV infection. There was no HBsAg positivity seen under the age of 5 years indicates the immunization program is running effectively in the region. Although the highest prevalence rate of 8.1% was observed in the age group of 45 – 50 years and only 74 individuals were tested in this age group. Our main concern remains in the age groups above 15 years and elder, as HBsAg seroprevalence was likely higher than in those under 15 years in Jumla. HBV infection being greater in these young age groups may be due to sexually active groups with greater exposures and interaction in society as compared to children and aged persons.

The study also reveals more individuals come for HBV screening during the winter season than summer which may be due to more people tends to become sick during winter and many of them get tested for HBV along with other routine tests. Some special measures can be employed by spreading public awareness, give information about HBV infection, mode of transmission, ways of protecting others from getting infected, and the availability of vaccines. Hence that

a greater number of individuals voluntarily come to health setup for HBV screening which helps to give a fair idea for future planning methods to be employed to reduce the new infection and mortality due to HBV infection and its complications.

In 2016, the WHO set targets of reduction in new cases of HBV infection by 90% and an associated 65% decline in HBV-related mortality to be achieved by the year 2030.<sup>18</sup> Applying this strategy locally may help to reach the target set by WHO in Jumla and the surrounding area.

This study results provide an estimation of HBV infection prevalence in Jumla which may help to manage HBV prevention, treatment, and management programs while expecting more generalized prevalence estimates from studies conducted on randomizing samples. These results also help us to prioritize groups identified as most at risk of HBV infection.

There are some limitations in this study. First, the study was conducted in a large sample size but low coverage with individuals visiting KAHS-TH, Jumla for HBV screening during one-year. Second, the study population was not randomly selected with limited numbers of variables for analysis. Third, the risk factors associated with HBV infection was not determined in the study due to the limited information provided in the hospital record. At last, this study only based on HBsAg testing to estimate the HBV infection prevalence, consequently, participants with acute infection or chronic carriers may have been overlooked thus underestimating the total HBV infection prevalence.

## CONCLUSION

The HBV infection was higher in Jumla as compared to an overall prevalence of Nepal. Males were highly infected than females and the middle age group was at the high-risk group of HBV infection. Thus, to lower the prevalence rate, the government should take strong steps regarding massive awareness and vaccination programs involving both community sector organizations and the media to decrease the burden of HBV infection from all states of Nepal. Besides, a widespread intervention on prevention,

control, and treatment are essential in prevalent areas to address the present and future liver associated health problems considering the high prevalence of the infection.

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