

## Assessment of Risk Factors of Hepatitis B; A Case-Control Study

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### ABSTRACT

**Background:** Global health is facing numerous health problems but Hepatitis B Virus is regarded as a major health concern because it has manifested among 7% of the world's population. The majority of people who are infected with this virus are reported from developing countries and they have little to no access to medical facilities; their options of getting a proper treatment are minimal. Hepatitis B Virus is a blood-borne disease; it is transmitted from person-to-person through contact and practices that involve the exchange of body fluids such as unsafe sex or blood transfusions of an infected person. Vertical transmission can also aid in the spreading of the Hepatitis B Virus, contaminated needles used in the injection of drugs or infected needles used for tattoos can also be fundamental tools for spreading this virus. This study was done to assess and find the risk factors for hepatitis B in the region of Abbottabad district.

**Methods:** A case-control study was done among the patients visiting Ayub Teaching Hospital for regular checkups. The sample included 80 cases and 80 controls. The non-probability convenient method was used as a sampling technique. Data was collected using a structured questionnaire. Data were analyzed using SPSS Statistics 23 and frequencies, mean, standard deviation, p values, and odds ratios were calculated.

**Results:** A total of 80 cases and 80 controls were taken (Male to female ratio was 1:4). The mean age of patients was  $38.74 \pm 13.597$ . The frequency of age ranging from age 18 to 30 was maximum. Odds ratios and p values were calculated for different risk factors. The odds ratio for the history of blood transfusion was 1.581. Patients who had family members with hepatitis B had a p-value of 0.002. Those who share toothbrushes had an odds ratio of 1.116. Individuals who used illicit injectable drugs had an odds ratio of 2.206. Patients with a history of dental procedures had an odds ratio of 1.581. People with tattoos, ear, and nose piercings had an odds ratio of 1.527. Patients with a history of surgical procedures had an odds ratio of 1.165.

**Conclusion:** This study showed that those patients who received a blood transfusion are at more risk of getting hepatitis B infection. Similarly, patients who live with hepatitis B patients or those who have infected family members are at risk. Sharing toothbrushes, and using illicit injectable drugs are at risk. Patients with a history of dental or surgical procedures are also at risk of developing hepatitis B.

**Keywords:** HBV (hepatitis B virus), HBsAg (hepatitis B surface antigen), Risk factors

### INTRODUCTION

Global health is facing numerous health problems but Hepatitis B Virus is regarded as a major health concern, it has manifested in 7% (350 million people) of the world's population. The prevalence rate of Hepatitis B virus is recorded

highest from 28 to 37 years of age.<sup>1</sup> The developing countries suffer the most in this regard due to their limited medical facilities and with HBsAg recorded as the highest in these regions.<sup>2</sup> The cases of Hepatitis B are increasing tremendously in developing countries; annually around 50 million cases of this virus are reported. among them, there are 5 - 10 % adults and up to 90 % chronically infected infants. 75% of these cases arise from developing regions such as Asia where Hepatitis B is regarded as the major cause of serious health conditions such as hepatocellular carcinoma, chronic hepatitis, and cirrhosis.<sup>3</sup> In Pakistan the data on frequency and risk factors for Hepatitis B is currently not available but the carrier rate of Hepatitis B virus is 3 - 5% with total estimated cases around 7 - 9 million.<sup>4</sup> Pakistan suffers the most on a global level with regard to recorded cases of chronic hepatitis leading to liver failure and hepatocellular carcinomas.<sup>5</sup>

Hepatitis B virus was originally named "Australian Antigen" because this virus was mainly found in the natives of Australia in 1965.<sup>7</sup> This virus consists of a unique structure with its DNA sequence surrounded by surface proteins.<sup>6</sup> Hepatitis B virus can either be acute or chronic, if a person suffers from this virus for a short period of time it is characterized as acute hepatitis; many people are asymptomatic but usually, the symptoms range from loss of appetite to possible abdominal pain, nausea with reported complains of myalgia and a low-grade fever. When a person contracts this virus, the symptoms usually appear after the 45th day or anywhere between the 45 - 180 days mark.<sup>8</sup> Hepatitis B Virus can cause chronic infections in the body and lead to progressive liver diseases; it slowly degenerates the liver and in 30 years the body faces severe complications such as liver cirrhosis, hepatocellular carcinoma (HCC), and chronic liver failure.<sup>9</sup>

There are multiple factors that can cause the transmission of Hepatitis B Virus; blood transfusions from an infected person can swiftly pass this virus to other people, contaminated needles used for injection of drugs or drug abuse, reuse of blades and needles for body piercings and unsafe sex practices are detrimental in the transmission of this virus. Most young children suffer from hepatitis b virus because they usually contract it from their mothers; Vertical transmission is the most common mode of transmission of Hepatitis B cases in young children. People who contracted the Hepatitis B virus also have a history of hemodialysis and surgeries performed with non-sterile equipment.<sup>10,11</sup>

In 1981 The Food and Drug Administration in America approved the first vaccine. the vaccine was mainly extracted from plasma but was later discontinued. Currently, the vaccines that are used against Hepatitis B are synthetically formed and they have numerous side effects such as swelling and redness at the site of injection and sometimes soreness.<sup>12</sup> As the vaccine is administered to the body; antibodies are produced against the Hepatitis B antigens which are significantly important in the identification of infections caused by the Hepatitis B virus. The main antigens that are used in the serological tests are HBcAg, HBsAg, and HBeAg.<sup>13</sup> There are different drug treatments available for the Hepatitis B virus but the most effective agents used against this virus are oral antiviral and interferon alpha drugs (INF $\alpha$ ). These drugs are currently administered in different parts of the world.<sup>14,15</sup>

There is currently little to no data available on the frequency and risk factors of the Hepatitis B Virus in Pakistan. For this purpose, a case-control study was conducted at the tertiary care hospital, Abbottabad to assess and record the frequency and risk factors of this Virus.

### MATERIAL AND METHODS

To assess the frequency and risk factors of Hepatitis B Virus a case-control study was conducted from December 2018 to June 2019 at Ayub Teaching Hospital (ATH), Abbottabad. Overall, 60 participants were used in the sample population; all of them were

subjected to a non-probability convenient sampling technique. There were 80 cases and 80 controls. Questionnaires were the only mode of data collection in this study with variables of interest and specific questions were also asked from those questionnaires by the interviewers. By acknowledging participants with the privacy of data and ethics, their consent was taken for this study. There were participants from both genders with variable ages. Those participants who were not cooperative or patients who had already done Hepatitis B vaccinations were eliminated from this case study. SPSS - 23 was used for analyzing data. For this study, qualitative and quantitative variables were calculated; Frequency and Percentages were the only two qualitative variables in this study. While for Quantitative variables, the Mean ± SD was calculated. To highlight the association between the risk factors and the development of the disease the odds ratios and P values were also calculated. All the data derived was presented as tables:

**RESULTS**

The mean age of all the participants/patients in this study was 38.74 ± 13.597. Overall, there were 80 cases and 80 controls. There were 44 (27.5%) patients who were diagnosed within 6 months of contracting Hepatitis B virus, followed by 20 (12.5%) patients who were diagnosed with this virus from a period of 6 months to 2 years. While only 16 (10%) patients were diagnosed later, after 2 years of contracting Hepatitis B virus. There were 80 cases and 80 controls; Out of 80 cases the numbers of cases for males were 47 (58.8%) and the numbers of cases for female were 33 (41.2%) While out of 80 controls the numbers of males were 49 (61.2%) and the numbers of females were 31 (38.8%) collectively with an odds ratio of 0.901. Out of the total 80 cases, the number

of married and unmarried cases greatly varied; 62 (77.5%) were married while 15 (14.4%) were unmarried. The number of widowed and divorced cases was minimal; 2 (2.5%) cases were reported as widowed while 1 (1.2%) case was reported as divorced. A similar data pattern was observed in overall 80 controls; 68 (85%) of the controls were reported to be married while 8 (10%) controls were reported to be unmarried. Minimal figures were recorded for controls in the categories of widows and divorced such as; 4 (5%) controls were widowed with only 1 (1.2%) control being divorced. The data on illiteracy between cases and controls did not greatly differ; 42 (52.5%) cases were reported to be illiterate while 39 (48.8%) controls were reported to be illiterate. Out of the total 80 cases; 68 (85.0%) patients were reported to be poor. While out of a total of 80 controls; 61 (76.2%) were reported to be poor. There were also reported cases of blood transfusions with little to no disparity between the cases and controls. Out of the total 80 cases; 20 (25%) patients had a blood transfusion in the past while similar figures were observed in the controls. Out of the total 80 controls; 20 (25%) of them had a history of blood transfusions in the past. The odds ratio was calculated and derived to be 1.581. Treatments such as hemodialysis or surgical procedures such as organ transplants were not observed in cases or controls. However, there were reported cases of participants whose family members had contracted Hepatitis B Virus. Out of the total 80 cases; 28 (35.0%) patients had family members who were diagnosed with Hepatitis B Virus. Out of the total 80 controls; 6 (7.5%) patients were reported to have family members diagnosed with Hepatitis B Virus. The data on other variables are stated below.

Table 1:

Case/control	Illicit injectable drugs		Sharing of syringes		Use of shared toothbrush/razor		Dental procedure		Surgical procedure	
	Case	Yes	2 (2.5%)	Yes	1(1.2%)	Yes	11(13.8%)	Yes	49(61.2%)	Yes
	No	78(97.5%)	No	1(1.2%)	No	69(86.2%)	No	31(38.8%)	No	44(55%)
	Total	80(100%)	N/A	78(97.6%)	Total	80(100%)	Total	80(100%)	Total	80(100%)
Control	Yes	1(1.2%)	Yes	1(1.2%)	Yes	10(12.5%)	Yes	40(50%)	Yes	33(41.2%)
	No	79(98.8%)	N/A	79(98.8%)	No	70(87.5%)	No	40(50%)	No	47(58.8%)
	Total	80(100%)	Total	80(100%)	Total	80(100%)	Total	80(100%)	Total	80(100%)
P-value	0.560		0.363		0.815		0.152		0.632	

Table 2:

Case	Tattooing / ear / nose piercing		Received IV Fluids		Disposable syringe usage	
		Yes	35 (43.8%)	Yes	68 (85%)	Yes
	No	45 (56.2%)	No	12 (15%)	No	6 (7.5%)
	Total	80 (100%)	Total	80 (100%)	Total	80 (100%)
Control	Yes	27 (33.8%)	Yes	72 (90%)	Yes	73 (91.2%)
	No	53 (66.2%)	No	8 (10%)	No	7 (8.8%)
	Total	80 (100%)	Total	80 (100%)	Total	80 (100%)
Odd Ratio	1.165		0.63		1.18	

**DISCUSSION**

Numerous studies in different parts of the world were conducted to assess the frequency and risk factors of the Hepatitis B Virus. A study of a similar paradigm was conducted in Ethiopia on 125 Hepatitis patients by Ayele AG et al. Their findings were strikingly similar to the study that we conducted. Out of the total 125 patients; 76 (63.3%) were recorded to be males and 44 (36.7%) were recorded to be females. (Hence the male to female ratio was recorded at 1.7). while out of our total 80 cases; 47 (58.8%) patients were recorded to be male and 33 (41.2%) patients were recorded to be female. The odds ratio for gender disparity was recorded at 0.901 which concluded that gender is not a possible risk factor for Hepatitis B Virus. In the study that we conducted of 80 cases and 80 controls; the majority of the patients were below 31 years of age ranging from 18 - 30 years. The mean age for our study was recorded at 38.74 ± 13.597 while the mean age in their study was recorded at 40.9 ± 14.00 ranging from 18 - 80 years.<sup>7</sup> The number of patients who tested positive for Hepatitis and the

number of people who had blood transfusions in the past significantly overlapped. Out of 70 patients who tested positive for Hepatitis B, 25 (35.7%) patients had a blood transfusion in the past hence recording a P - value greater than 0.05.<sup>7</sup> The study that we conducted at ATH, Abbottabad; 40 (25%) patients were recorded to have a history of blood transfusion in the past of whom 20 (25%) patients tested positive for Hepatitis B. The odd ratio was recorded at 1.581. Hence concluding that blood transfusion had a significant impact on patients diagnosed with Hepatitis; 8 (10%) patients diagnosed with Hepatitis received their blood transfusion between 6 months to 2 years prior to being diagnosed with Hepatitis. The disparity between the literacy and illiteracy rate of people diagnosed with Hepatitis was notably highlighted by Mujeeb SA et al. In their study they found out that 61% of their patients were recorded to be illiterate while 39% of them were recorded to be literate.<sup>18</sup> The study that we conducted showed similar patterns of data with the majority of people being diagnosed with Hepatitis

being illiterate (81 patients). Hence it was concluded that there is low social awareness of the risk factors of hepatitis.

There are multiple risk factors for Hepatitis B but low socioeconomic status poses a serious threat to society. A study conducted by Akbar et al highlighted that about 4% of people with low socioeconomic status tested positive for HBsAg.<sup>16</sup> While the study that was conducted at ATH, Abbottabad shared similar patterns of data with 129 (80.6%) patients belonging to low socioeconomic standing.

Since the study conducted at ATH Abbottabad, had no dialysis or transplant patients; a different study was observed in which Moyer LA et al highlighted that among the 355 patients with Hepatitis B; 260 of them were active users of hemodialysis while 95 of them were staff members at the hemodialysis facility unit.<sup>19</sup> A similar study regarding transplant patients who tested positive for Hepatitis B Virus after their surgery was highlighted by Dickson RC et al; out of 23 recipients of a liver transplant, 18 of them developed Hepatitis B Virus who received it from anti-HBc-positive donors. While out of 651 recipients of liver transplants from anti-HBc-negative donors only 3 were positive for Hepatitis B Virus.<sup>20</sup>

A study conducted by Khattak MF et al revealed that out of a total of 103858 donors, 3.3 % of them tested positive for HBsAg.<sup>24</sup> While the study that was conducted at ATH, Abbottabad recorded only 2 patients who were frequent donors hence it led to no significant value.

The study that was conducted by ATH, Abbottabad revealed that out of 69 patients who performed surgical procedures, 36 (52.2%) were reported to be cases. Their odd ratio was calculated at 1.165 which concluded that surgical procedures pose a serious threat to the transmission of Hepatitis B Virus. This risk factor was further supported by a study done by Polakoff S et al; their study revealed that out of 153 patients, 27 (17.6%) of them went under surgical procedures and later tested positive for Hepatitis B Virus.<sup>23</sup>

There were similar patterns observed in acquiring Hepatitis B Virus between noninfected people sharing their day-to-day lives with positive Hepatitis B patients. A study conducted by Toukan AU et al further highlighted this paradigm; Patients positive with HBsAg had positive siblings and mothers.<sup>21</sup> Similar patterns of data were recorded in our study; out of 30 patients who had family members diagnosed with Hepatitis B, 28 (35%) of them were recorded to be cases. Its P - value was recorded at 0.02 which is far less than 0.05.

A study conducted by Shah HB et al highlighted the aseptic techniques used by people in urban and rural areas; the data suggested that 100% of the urban population used aseptic techniques while the rural areas were recorded at 93% for their use of aseptic measures.<sup>11</sup> The Study conducted at ATH Abbottabad also highlighted that 85 (53.1%) patients went to barbers who used aseptic measures in dealing with their clients.

With regards to the influence of injectable drugs in the transmission of Hepatitis B Virus or needles used for tattoos or body piercings such as ear or nose piercings; they had a significant impact on the number of positive Hepatitis B cases. The study conducted at ATH Abbottabad had similar results to that of the study conducted by Hagan H et al<sup>22</sup> It was recorded that out of a total of 62 patients who went under body piercing procedures involving the use of a needle, 35 (43.8%) of people were recorded to be positive for Hepatitis B virus. Hence it is a risk factor for Hepatitis B virus and is highlighted further in a study conducted by Jafari S et al who found similar results.<sup>17</sup>

## CONCLUSION

There are numerous risk factors that have been associated with Hepatitis B Virus but the risk factors that were recorded in our setup were; Patients having a family history of positive Hepatitis B patients. Mostly patients from the male gender, belonging to low socioeconomic status and low literacy rates were also recorded in these patients. Moreover, these patients also had a history of

blood transfusions, some of them went under surgical procedures, and some had body piercings such as tattoos and ear and nose piercings (the use of a contaminated needle was evident in this case). There was little to no awareness in them about this virus. Hence all of these factors are detrimental to the transmission of the Hepatitis B Virus.

## REFERENCES

1. Ayele AG, Gebre-Selassie S. Prevalence and risk factors of hepatitis B and hepatitis C virus infections among patients with chronic liver diseases in public hospitals in Addis Ababa, Ethiopia. *ISRN Tropical Medicine*. 2013 Jan 3;2013.
2. WHO|HepatitisB[Internet].2016[cited20March2016].Availablefrom:<http://www.who.int/csr/disease/hepatitis/whocdscsrlyo20022/en/index1.html>
3. Merican I, Guan R, Amarapura D, Alexander MJ, Chutaputti A, Chien RN, et al. Chronic hepatitis B virus infection in Asian countries. *J Gastroenterol Hepatol*. 2000;15(12):1356-61.
4. Ali M, Idrees M, Ali L, Hussain A, Rehman IU, Saleem S, et al. Hepatitis B virus in Pakistan: a systematic review of prevalence, risk factors, awareness status, and genotypes. *Virology*. 2011 Mar 6;8(1):1.
5. Ali SA, Donahue RM, Qureshi H, Vermund SH. Hepatitis B and hepatitis C in Pakistan: prevalence and risk factors. *IJID*. 2009;13(1):9-19.
6. Barbacid M, Breitman ML, Lauver AL, Long LK, Vogt PK, Beemon K, Wang LH. Synthesis and assembly of hepatitis B virus surface antigen particles in yeast. *Nature*. 1998 22;298:347
7. Hepatitis B [Internet]. New South Wales; 2016 [cited 20 March 2016]. Available from: [https://www.afao.org.au/\\_data/assets/pdf\\_file/0011/4511/BP0108\\_Hepatitis\\_B.pdf](https://www.afao.org.au/_data/assets/pdf_file/0011/4511/BP0108_Hepatitis_B.pdf)
8. Foundation T. Hepatitis B Foundation: Managing HBV: Acute Hepatitis B [Internet]. 2016 [cited 20 March 2016]. Available from: [http://www.hepb.org/patients/acute\\_infections.htm](http://www.hepb.org/patients/acute_infections.htm)
9. Bukhtari N, Hussain T, Iqbal M, Malik AM, Qureshi AH, Hussain A. Hepatitis B and C single and co-infection in chronic liver disease and their effect on the disease pattern. *JPM*. 2003;53(4):136-40.
10. Mele A, Corona R, Tosti ME, Palumbo F, Moiraghi A, Novaco F, et al. Beauty treatment and risk of parenterally transmitted hepatitis: results from the hepatitis surveillance system in Italy. *Scand J Infect Dis* 1995;27(5):441-4.
11. Shah HB, Dar MK, Jamil AA, Atif I, Ali RJ, Sandhu AS, Usmani AQ. KNOWLEDGE, ATTITUDES, AND PRACTICES OF HEPATITIS B AND C AMONG BARBERS OF URBAN AND RURAL AREAS OF RAWALPINDI AND ISLAMABAD. *JAMC*. 2015;27(4).
12. Foundation T. Hepatitis B Vaccine Information from Hepatitis B Foundation: [Internet]. 2016 [cited 23 March 2016]. Available from: [http://www.hepb.org/hepb/vaccine\\_information.htm](http://www.hepb.org/hepb/vaccine_information.htm)
13. Walker BR, Colledge NR, Ralston SH, Penman ID. *Davidson's Principles and Practice of Medicine*. 22nd ed. New Delhi: Elsevier Limited; 2013:948-52.
14. Wai CT, Lok AS. Treatment of hepatitis B. *J Gastroenterol*. 2002;37(10):771-8.
15. Cooke GS, Main J, Thursz MR. Treatment for hepatitis B. *Bmj*. 2010;340:b5429.
16. Akbar N, Basuki B, Garabrant DH, Sulaiman A, Noer HM. Ethnicity, socioeconomic status, transfusions, and risk of hepatitis B and hepatitis C infection.
17. Jafari S, Buxton JA, Afshar K, Copes R, Baharlou S. Tattooing and risk of hepatitis B: a systematic review and meta-analysis. *CJPH*. 2012;207-12.
18. Mujeeb SA, Pearce MS. Temporal trends in hepatitis B and C infection in family blood donors from interior Sindh, Pakistan. *BMC infectious diseases*. 2008 Apr 10;8(1):1.
19. Moyer LA, Alter MJ, Favero MS. Hemodialysis-Associated Hepatitis B: Revised Recommendations for Serologic Screening. In *Seminars in Dialysis* 1990(Vol. 3, No. 4, pp. 201-204). Blackwell Publishing Ltd.
20. Dickson RC, Everhart JE, Lake JR, Wei YU, Seaberg EC, Wiesner RH, et al. Transmission of hepatitis B by transplantation of livers from donors positive for antibody to hepatitis B core antigen. The National Institute of Diabetes and Digestive and Kidney Diseases Liver Transplantation Database. *Gastroenterology*. 1997 Nov 30;113(5):1668-74.
21. Toukan AU, Sharaiha ZK, Abu-El-Rub OA, Hmoud MK, Dahbour SS, Abu-Hassan HA, et al. The epidemiology of hepatitis B virus among family members in the Middle East. *Am J Epidemiol*. 1990;132(2):220-32
22. Hagan H, Jarlais DC, Friedman SR, Purchase D, Alter MJ. Reduced risk of hepatitis B and hepatitis C among injection drug users in the Tacoma syringe exchange program. *AJPH*. 1995;85(11):1531-7.
23. Polakoff S. Acute hepatitis B in patients in Britain related to previous operations and dental treatment. *Br Med J (Clin Res Ed)*. 1986;293(6538):33-6.
24. Khattak MF, Salamat N, Bhatti FA, Qureshi TZ. Seroprevalence of hepatitis B, C, and HIV in blood donors in northern Pakistan. *J Pak Med Assoc*. 2002 Sep;52(9):398-402.