

## Research Article

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# Assessment of factors affecting and causing Hepatitis B in Balochistan-Pakistan

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### Abstract

Hepatitis B infection caused by HBV is transmitted through HBV contaminated blood and body fluids, is a major communicable disease of vertical transmission. HBV infection is endemic in Asia Pacific regions including Pakistan. The main objective of this study was to determine most common factors affecting and causing Hepatitis B. A cross sectional research study was conducted where blood samples were taken from suspected Hepatitis B individuals for diagnosis and confirmation of HBV. Social and demographical factors were studied with the help of questionnaire. Hepatitis B disease is promoted through sharing of equipment and environment with HBV infected individuals. Smoking either active or passive was significantly positively correlated with Hepatitis B disease whereas education and socioeconomic status were negatively correlated with Hepatitis B. The study concludes that unhygienic practices particularly in dental clinics substantially increase the risk of Hepatitis B. The present study serves as a primary data and will be helpful in future research on Hepatitis B in Balochistan.

**Keywords:** Communicable diseases; Environmental health; Epidemiology; Hepatitis B Virus; Infection; Prevalence

### Introduction

Hepatitis is an inflammation and most commonly caused by viral infection. More than 240 million people worldwide have chronic Hepatitis B virus (HBV); with the highest rates of infection in Asia and Africa, placing them at increased risk of developing cirrhosis, hepatic decompensation and hepatocellular carcinoma (HCC) [1]. Approximately 45% of the world's population live in regions that are highly endemic for HBV infection, most infections in these regions are acquired parentally or during early childhood [2]. Infection with HBV can

cause acute as well as chronic infection that may lead to liver failure or hepatocellular carcinoma. Several studies have reported that Hepatitis B virus can replicate in human pancreatic tissue causing impairments of pancreatic function [3-5]. HBV is endemic in Pakistan with prevalence of 2.5%. The country has most cases of chronic infections where 8.6 million (4.8% of the population) are affected with Hepatitis B and C diseases. The most affected province was Balochistan with the prevalence of 4.3%. Although, Hepatitis B disease is asymptomatic in early silent phase but

vertical transmission in early childhood is the main causative factor of HBV and common in highly endemic areas where infants are born to HBV infected mothers [6].

Household contact with chronically infected HBV members of the family and occupational health care exposure to blood products being used in hospitals, laboratories and haemodialysis are other common risk factors of Hepatitis B [7]. Whereas, common mode of transmission particularly in rural areas of Pakistan is attributed to reuse of syringes and contaminated equipment. Pakistan is among the top syringe consuming countries where 2.4 billion syringes are used and reused every year spreading HBV and HCV infections [1].

Specific socio-demographic characteristics, Hepatitis B knowledge associated with age and sex differences along with Intravenous drug use (IDU) are some most important factors widely assessed with HBV transmission in different research settings. However, more studies at different clinical settings are required to gain further knowledge about region specific transmission patterns and contributing factors. This study was conducted with the aim to determine most common factors affecting and causing Hepatitis B in the region.

### Materials and methods

The current cross sectional research study was conducted (January 2017 – October 2017) in department of biotechnology, Balochistan University of Information Technology Engineering and Management Sciences (BUIITEMS). The study was based on blood samples collected from suspected Hepatitis B individuals having symptoms of fever, abdominal pain, loss of appetite, weakness, fatigue and yellowing of skin. All the study individuals (N = 400, suspected Hepatitis B patients) were referred by out patient departments (OPDs) of various hospitals through their physicians to Assa Lab, Saleem medical complex, Balochistan, Pakistan for the

diagnosis and confirmation of Hepatitis B. Social and demographical factors were also collected with the help of questionnaires. All individuals were included in the study after obtaining their informed consent. The study was approved by ethical committee of BUIITEMS.

We used Hepatitis B virus surface antigen (HBsAg) rapid test kit for the diagnosis and confirmation of HBV. HBsAg kit method have about 98% accuracy with high specificity and positive predictive values. The method is user friendly, cheap and impose least discomfort to the patient as only small specimen size is required. The results of the methods are reliable and can be confirmed by enzyme-linked immunosorbent assay (ELISA) and polymerase chain reaction (PCR) methods. About five ml of blood was collected with disposable sterile syringe from each suspected Hepatitis B individual via aseptic veni-puncture. The sera from the blood samples were separated to avoid hemolysis and stored at -20°C until tested.

Samples were brought to room temperature prior to testing and analyzed according to manufacturer's recommendations. 120 µL sample was drawn onto the sample well of the cassette using the pipette. After waiting 10-20 minutes the results were ready for reading. It was made sure to read the results before 20 minutes. The results provided by HBV kit were analysed as either HBV positive or HBV negative.

### Results

The age of all study individuals ranged from 16.7 years to 55.2 years (mean 33.5 years, SD 8.3). 69 % of individuals (N = 276) participated in the study were male and 31 % of individuals (N = 124) were female. The characteristics of all individuals (N = 400) included in the study are shown in (Table 1).

Out of total 400 suspected Hepatitis B individuals 33.7% (N = 135) individuals were confirmed as serologically positive for HBV. The prevalence of HBV positive individuals was higher in male individuals

(40.8%, N = 102) than female individuals (22%, N = 33) (Figure 1).

The age of individuals confirmed as serologically positive for HBV ranged from 18.2 years to 53.5 years (mean 32.7 years, SD 8.5). The characteristics of individuals confirmed as serologically positive for HBV (N = 135) are shown in (Table 2).

HBV was more common in illiterate (no elementary school education) individuals (39.3 %, N = 53) than educated individuals. According to study results, education was significantly negatively correlated to Hepatitis B. Individuals having elementary school education were more effected (20.0 %, N = 27) by Hepatitis B comparatively higher than individuals having secondary school education (17.8 %, N=24) than having higher secondary education (17.0 %, N=23), while individuals having

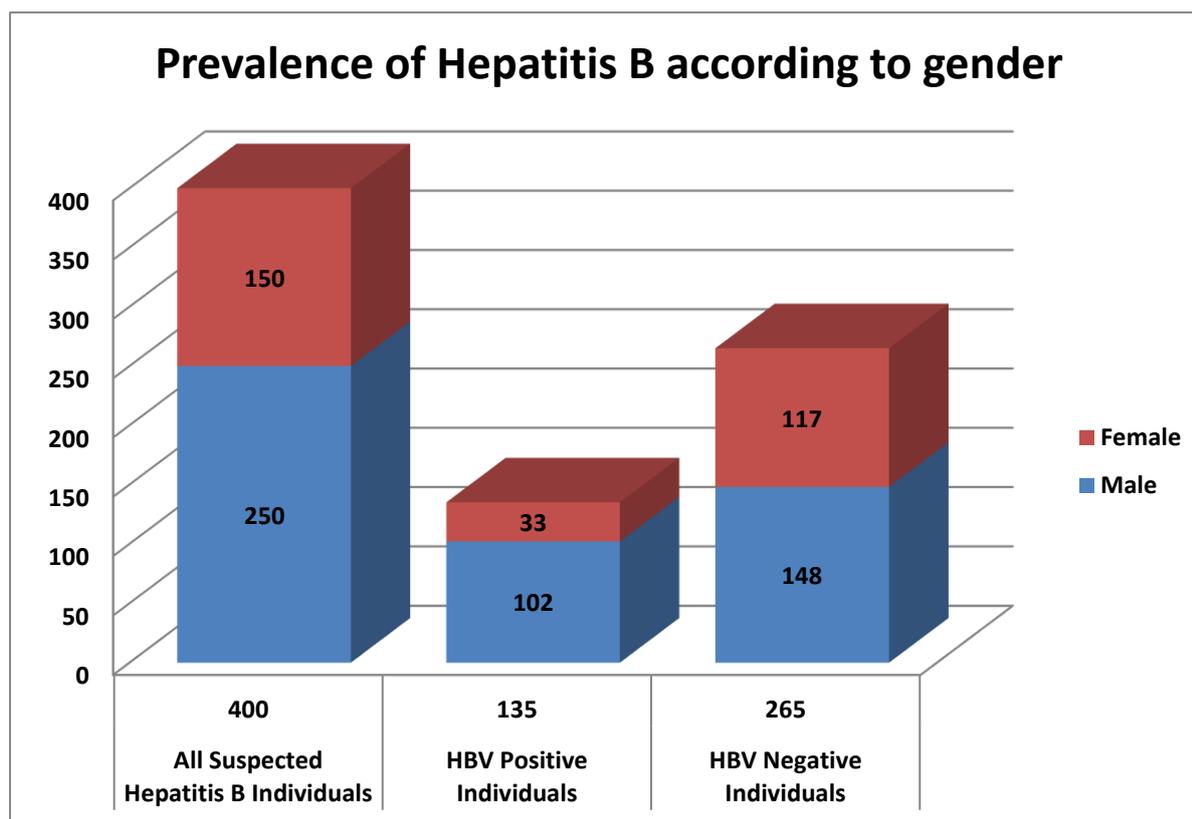
bachelors level (university degree education) were least effected (5.9 %, N=8) by Hepatitis B (Table 2).

Hepatitis B disease was more common in individuals with history of active smoking (52.6 %, N= 71) and passive smoking (36.3 %, N=49) while only (11.1 %, N = 15) individuals were not smoking. Also, HBV was most common in individuals who ever had dental care (44.4 %, N = 60) (Table 2). Hepatitis B prevalence was more common in individuals with low socioeconomic status (88.9 %, N = 120) having monthly income less than 30 thousand (K) PKR (Pakistani rupees). Hepatitis B was positively correlated with socioeconomic status having less individuals in higher socioeconomic class than lower socioeconomic class (Table 2).

**Table 1. Characteristics of all individuals (N = 400) participated in the study**

	Number of individuals	Percentage of individuals
<b>Age (years): mean (SD)</b>	33.5 (8.3)	
<b>Gender:</b>		
Male	276	69.0
Female	124	31.0
<b>Education:</b>		
Bachelors <sup>a</sup>	51	12.7
Higher Secondary Education	88	22.0
Secondary School Education	108	27.0
Elementary School Education	62	15.5
No Education	91	22.8
<b>Dental care procedure:</b>		
Yes	74	18.5
No	326	81.5
<b>Socioeconomic status:<sup>b</sup></b>		
<10	131	32.7
11-30	167	41.8
>30	102	25.5
<b>Smoking status:</b>		
Active smoking	112	28.0
Passive	165	41.3
No smoking	123	30.7

<sup>a</sup>University degree, <sup>b</sup>Thousand Pakistani rupees per month



**Figure 1. Prevalence of Hepatitis B according to gender**

**Table 2. Characteristics of individuals (N = 135) confirmed as serologically positive for HBV**

	Number of individuals	Percentage of individuals
<b>Age (years): mean (SD)</b>	32.7 (8.5)	
<b>Gender:</b>		
Male	102	75.6
Female	33	24.4
<b>Education:</b>		
Bachelors <sup>a</sup>	8	5.9
Higher Secondary Education	23	17.0
Secondary School Education	24	17.8
Elementary School Education	27	20.0
No Education	53	39.3
<b>Dental care procedure:</b>		
Yes	60	44.4
No	75	55.6
<b>Socioeconomic status:<sup>b</sup></b>		
<10	53	39.3
11-30	67	49.6
>30	15	11.1
<b>Smoking status:</b>		
Active smoking	71	52.6
Passive	49	36.3
No smoking	15	11.1

<sup>a</sup>University degree, <sup>b</sup>Thousand Pakistani rupees per month

## Discussion

Hepatitis B is common infectious disease in undeveloped, developing and resource poor countries. We studied clinical, social and demographical risk factors associated with Hepatitis B. Hepatitis B is male dominant disease and the disease was more dominant in middle age individuals. The male to female ratio is higher and HBV disproportionately strikes more men than women worldwide. The dominance in middle age particularly in males may be due to the fact that majority of female individuals of the populations in Pakistani society prefer to stay at home most of the time while male individuals are more socially active and interactive that may increase the risk of catching the HBV from suspected or diseased individuals. In addition, although natural history of HBV infection vary with age, but HBV is asymptomatic in early silent phase. Also, the duration of this phase may be for many years and acute Hepatitis B is often unrecognized in children younger than five years old. Clinical acute Hepatitis B is more frequent in adults than children and probability of becoming chronic carrier of Hepatitis B is greater in children than adults [8-12].

According to our study results, Hepatitis B was more common in illiterate (no elementary school education) individuals than educated individuals. Also, education was significantly negatively correlated to Hepatitis B. Educated individuals tend to have more awareness comparatively better than un-educated individuals and having better understandings of living in a healthy and clean environment [13].

There was no significant association between body mass index (BMI) and Hepatitis B. Hepatitis B was more prevalent in individuals with normal BMI score. Although, individuals with overweight, underweight and obesity had also Hepatitis B, but the proportion was significantly smaller. These results might be due to chance findings and may not be explained.

HBV disease was more common in individuals with history of active and passive smoking. The International Agency for Research on Cancer (IARC) has classified HCC as one of the tobacco related cancers in 2004. Cigarette smoke contains hundreds of different carcinogens that promote HBV infection. Although, independent effects of HBV infection and cigarette smoking on the risk of HCC have been established; the possible interaction between these factors is not well characterized. Also, in Pakistan it is common to be passive smoker and smoking is practiced at public places and in public transports. There are rules for not smoking in public places and transports but the implementation of these rules are not commonly practiced [14, 15].

One other important finding of our study was high prevalence of HBV in individuals with dental care procedures. Hepatitis B was most common in individuals ever had dental care. Hepatitis B disease can be transmitted through dental care procedure due to unhygienic conditions and use of unsterilized equipment in dental care clinics. In Pakistan, especially in poor rural settings updated sterilization techniques are rarely used in dental clinics which mostly result in infectious diseases including Hepatitis B. There can be substantial decrease in the HBV infectivity only by following good clinical hygiene practices [16].

HBV prevalence was more common in individuals with low socioeconomic status. This trend is also more common in developing countries. We considered income defined according to Organization for Economic Co-operation and Development (OECD). Usually higher socioeconomic status individuals would have more opportunities and resources to access health care and can maintain healthier nutrition. The results also concluded that individuals with balanced nutritional status had less chances of having Hepatitis B disease [17, 18].

We also collected data about vaccination history and occupational history. Surprisingly, 46.3% individuals (results not shown) were not vaccinated for HBV and all individuals confirmed as serologically positive for HBV were not vaccinated. Although, Hepatitis B vaccinations are included in national immunization programmes, but individuals often miss vaccinations for different reasons including lack of awareness, resources, accessibility and quality of vaccinations. Sometimes, it is also common in societies where they do not vaccinate their children for some baseless religious reasons. Regarding occupational history, none of the individuals was working in Hepatitis B risk related environment.

#### **Conclusion and limitations**

In conclusion, individuals with no education and low socioeconomic status are more prone to Hepatitis B infection. Also, Smoking either active or passive is significantly positively correlated with Hepatitis B disease. The study also conclude that unhygienic practices particularly in dental clinics substantially increase the risk of Hepatitis B. The results of this study need to be interpreted with caution as the study had the limitations. This study was done with cross sectional study design therefore, the causal relationships between HBV positive individuals and various socioeconomic status factors could not be definitively established.

#### **Authors' contributions**

Conceived and designed the experiments: MW Khan & H Ullah, Performed the experiments: H Ullah & A Ullah, Analyzed the data: MW Khan & H Ullah, Contributed materials/ analysis/ tools: H Ullah & A Ullah, Wrote the paper: H Ullah.

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