

# Prevalence of Hepatitis B & C Virus with Respect to Different Age Groups in General Population of Bajaur Agency

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## ABSTRACT

Hepatitis B and C viruses are the pathogens whose cause hepatitis around the globe. In addition, world health organization estimate about 170 million people which is 3% of the world population are infected with HCV and are at risk of developing liver cirrhosis and or liver cancer, whereas Hepatitis B virus were prevalent as 257 million people had been trapped by this virus in 2015. Comparatively, HBV are more prevalent than HCV pathogen worldwide. Some factors like gender and age also play a role in the acquiring of hepatitis B & C infection. The objective of the present study to highlight issues of hepatitis B and C viral infection prevalence in Bajaur agency with respect to different age groups in order to personalize based highlighted this issue so that the people can get aware. The initial tests were performed for the screening of viruses while using chromatographic immunoassay method to determine hepatitis B virus (HBs-Ag) antigen and antibodies for hepatitis C virus in the serum of the patient. In this study, total of 80 (8.0%) samples were found positive for HBV and HCV. Among these 44(4.4%) and 36 (3.6%) were positive for HBV and HCV respectively out of 1000 sample. Out of 1000 sample 646(64.4%) were male and 354(35.4%) were females. The rate of HBV patients having different age groups which were: 0-20, 21-40, 41-60 and >60 year of age were found as 15(34.1%), 16(36.4%), 10(22.7%) and 03(6.8%) whereas, in HCV patients studied population in the likes of age groups, 0-20, 21-40, 41-60 and >60 the percentages were 12(33.3%), 17(47.1%), 04(11.1%) and 03(8.3%), respectively. Both the HBV and HCV infected groups were found significant for the age groups range from 21-40 and up-to 20 years (34.4% vs 33.3% ; P = 0.02 and P = 0.002, respectively). Among male, patients of HBs and HCV were 29(34.9%) and 22(61.1%) while, in female patients of HBs and HCV were 15(65.1%) and 14(38.9%), respectively. Gender Factor influencing HCV and has more males than females, because male are more expose to HCV transmitting incidences like using shaving blades and other sharp

things during work places. Age group 21-40 individuals had been greatly influenced by both the HCV and HBV infection in equal contribution, the main reason of these differences of HBV with other age groups could be the sexual transmission of HBV whereas, the HCV may be the using of shaving blades and these age group of people are there every time to do work to meet their daily expenses and thus more prone and chance to get this virus.

**Key words:** Hepatitis B, RNA virus, HCV, ICT, PCR, Bajaur

## Introduction

The inflammation of the liver is known as hepatitis. The inflammation of the liver mostly causes by different kinds of viruses such as hepatitis A, B, C, D and E viruses, which is characterized by acute and chronic phase of liver disease(1). According to world health organization (WHO) the infection of HCV is estimated about 170 million people, 3% of the world population are infected with HCV and are at risk of developing liver cirrhosis. The Occurrence of HCV infection in some other countries of African South East Asia, the Eastern Mediterranean and the Western Pacific is prevalent compared to countries in North American and Europe(2). Worldwide the hepatitis B virus (HBV) is the major burden in the health. The people that were infected by hepatitis B virus are more than 2000 million and 350 million people were constantly carrier of this virus. An every year about one million people die from hepatitis B, making it one of the foremost that are responsible for morbidity and mortality(3).

Hepatitis B virus belongs to Hepadna virus family i.e. attacks on liver and DNA. It has a double stranded of the DNA and circular genome. Viruses reproduce by reverse transcription and reproduction that occur in the liver. Hepatitis B virus enters to the blood where viral proteins and antibodies oppose them are found in infected patients (3). The other name of hepatitis B virus is Dane particle (virion), it is comprised of an outer lipid covered and icosahedra nucleocapsid core contain of protein. The immune-chromatography (ICT), Enzyme Linked Immunosorbent Assay (ELISA) and Polymerase chain reaction (PCR). Mostly ELISA method are used(4). HBV infection is one of the major causes of death related to cirrhosis and liver cancer (5). Some of the challenges with HBV infection are diagnosis and management (6). Vaccination is known to have significantly reduced mortality due to HBV infection. According to MaleweKolou, et.al this infection is majorly caused in the age group range from, in this study we also elaborated the same age group in HBV infected individual for the individualized therapy purpose. Hepatitis C is an RNA virus and causes infectious disease that affects the liver, HCV is the member of Flaviviridae family of viruses. Its genome is single-stranded RNA; enveloped with positive charge Genome of HCV was determined. The hepatitis C virus comprised of a core of genetic material (RNA), bounded by an icosahedra defensive enveloped made of protein, and further together with this in a lipid covered glycoprotein, E1 and E2, are grafted in the lipid (7). The hepatitis C virus structured protein composed by the hepatitis C virus and core protein, NS2, NS3, NS4A, NS4B, NS5A and NS5B. The symptomless patients with hepatitis C virus mostly present with chronic liver disease and cause fibrosis and when it stands for long time then it causes liver cirrhosis or may lead to parenchyma carcinoma of the liver(8). Symptoms of hepatitis are generally mild or vague nausea, fatigue, poor appetite, joint, muscle or, pain and weight loss and rarely acute liver failure may occur and in some cases of acute infection are related with jaundice(9). Hepatitis C virus can be transmitted by direct contact with an infected person's blood, like transfusion of blood products is the major factors, unsafe injections (reuse of glass syringe or needles), parents to offspring, homosexually and intravenous drug abuse, non-sexual contact in households, Shaving at barber shops, ear piercing, tattooing and improperly sterilized surgical or dental instruments(10).

There are many diagnostic tests for hepatitis C, that consist of immuno-chromatographic test, antibody enzyme immunoassay or ELISA, recombinant immune-blot assay and quantitative HCV RNA while using polymerase chain reaction(11). In the light of age contribution in HCV infection AC Jemilohun et.al reported in Nigerian population that, age group 20-40 are more prone to get HCV infection. Along with HBV we also evaluated HCV infection with respect to age groups in this study in order to individualizing the infected individuals.

## Materials and Methods

### Study site:

This study was conducted in district Bajaur Agency of the Federally Administered Tribal Areas of Pakistan. Bajaur District is a district in Malakand Division of Khyber Pakhtunkhwa province in Pakistan. Until 2018, it was an agency of the Federally Administered Tribal Areas, then during restructuring that merged FATA with Khyber Pakhtunkhwa, it became a district. According to the 2017 census, the population of the district is 1,093,684. It borders Afghanistan's Kunar Province with a 52 km border. The headquarters of the agency administration is in the town of Khaaras shown in Figure 1.



Figure.No.1: Map of District Bajaur

### Samples Processing:

The experiment was carried out at imperial college of business studies, Lahore with the collaboration of Bajaur Agency hospital. A total of 1000 samples were selected that were taken from the population of different area of Bajaur Agency and tested for HBS antigen and HCV antibodies. The data was recorded on pre-designed tested questionnaire and with the help of it each patient was evaluated attentively, and detailed medical history of everyone was taken and noted. Moreover, 5 ml of blood sample was collected from everyone by using disposable syringe in 5ml red top tube (clot activator), then blood was centrifuged at 5000 rpm for 5 minutes and then serum was taken into separate test tubes to perform further test. The initial screening was performed by immune-chromatographic immunoassay (ICT) for the qualitative detection of the antigen which is available on the site of hepatitis B virus surface antigen (HBs-Ag) and antibodies for hepatitis C virus (Anti HCV) seen within serum.

#### 4.1 Hepatitis B surface antigen detection on ICT

For the identification of HBs-Ag we used ICT strips method. Entire reagent and specimens were brought at room temperature before taking place with the assay. The test strip was picked up from the foil pouch and kept on a clean and neat dry surface, then 100µl serum sample was dispensed on the strip. After fifteen minutes the results were noted from the appearance of color lines accordingly. The validity of the kit confirmed by running of a control. Positive results were confirmed by both purplish red test bands and purplish red control bands appeared on the membrane of the strip. Only a red line present on the membrane of the strip in the control region (C) and no red line in the test region shows negative result.

#### 4.2 Hepatitis C antibodies detection on ICT

The test strip was picked up from pouch of the foil. It was kept on a clean and neat dry surface. Two and half micro liter serum sample was dispensed on the sample pad and added 2 drops of the buffer. After fifteen minute the results were noted by observing the appearance of the color bands. Similarly, the validity of the kit was checked by using a control. Both purplish red test band and purplish red control band presence on the

membrane of the strip which shows positive result. One purplish line presence on the control area(C) along with no red line in the test area shows negative result.

### Statistical Analysis

Statistical analysis was done by using SPSS 22.0 software. The qualitative data was analyzed by using chi-square test to know about the significance contribution, while for quantitative variable we used t-test a compare mean test and knew about the 95% CI in the study.

### Result

In this study, total of 80 (8.0%) samples were found positive for HCV and HBV out of 1000 samples in which 44(4.4%) were HBV positive and 36 (3.6%) were positive for HCV as shown in Figure 1. Out of 1000 sample 646(64.4%) were male and 354(35.4%) were females (table 2). The rate of HBV patients having different age groups which were: 0-20, 21-40, 41-60 and >60 year of age were found as 15(34.1%), 16(36.4%), 10(22.7%) and 03(6.8%) whereas, in HCV patients studied population in the likes of age groups, 0-20, 21-40, 41-60 and >60 the percentages were 12(33.3%), 17(47.1%), 04(11.1%) and 03(8.3%), respectively(Figure 1) (Table 1). Both the HBV and HCV infected groups were found significant for the age groups range from 21-40 and up to 20 years (34.4% vs 33.3%; P = 0.02 and P = 0.002, respectively) Figure 2). Among male, patients of HBs and HCV were 29(34.9%) and 22(61.1%) while, in female patients of HBs and HCV were 15(65.1%) and 14(38.9%), respectively (Figure 3).

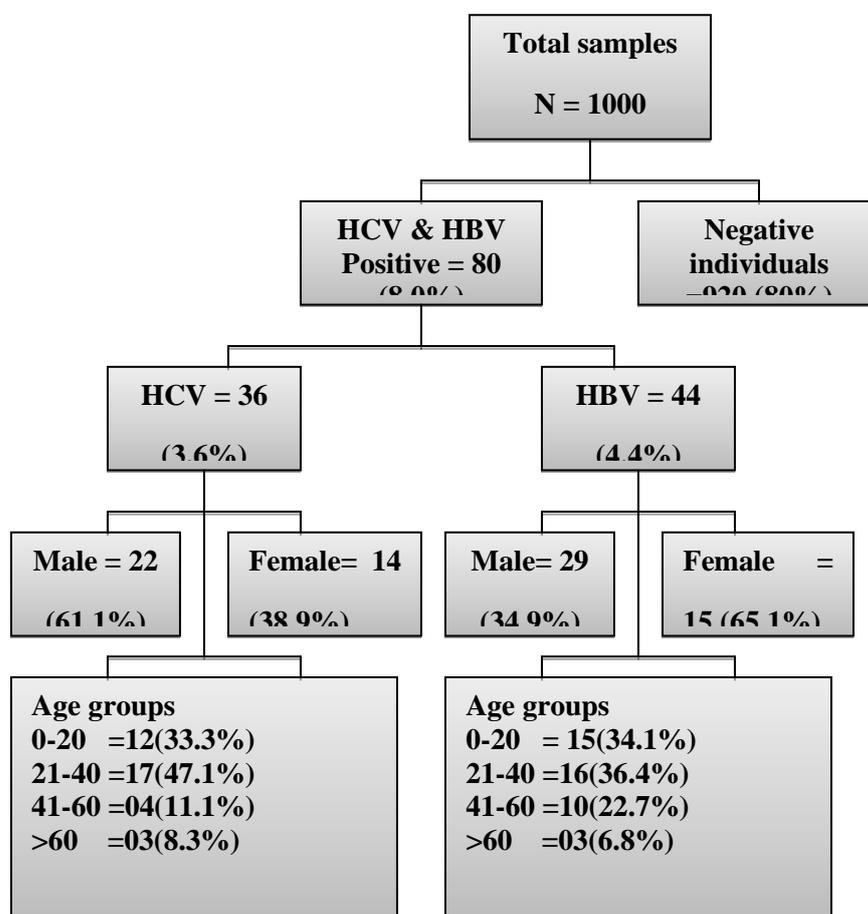
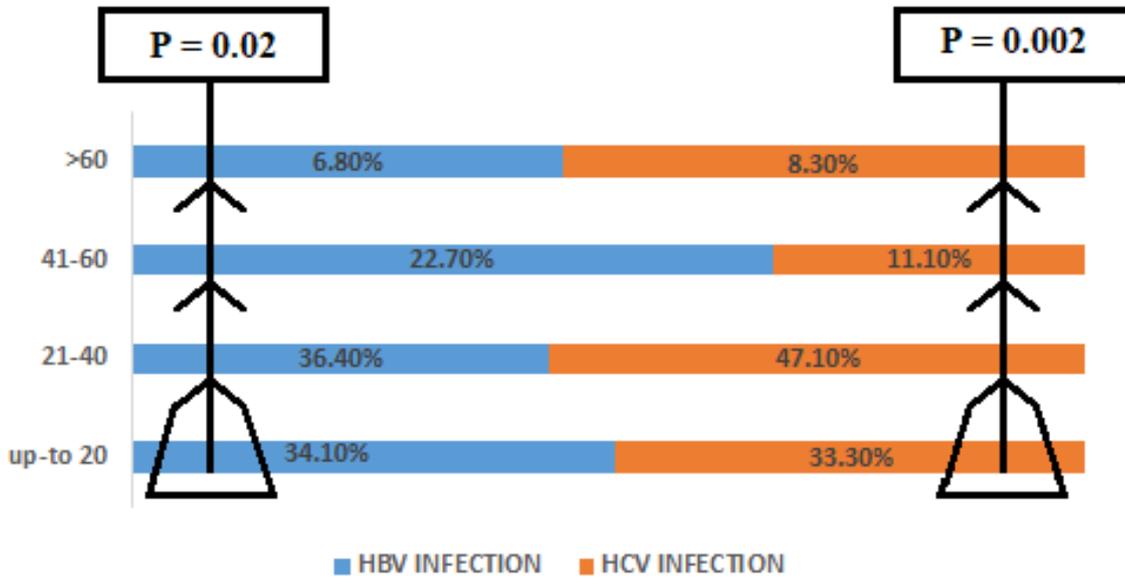
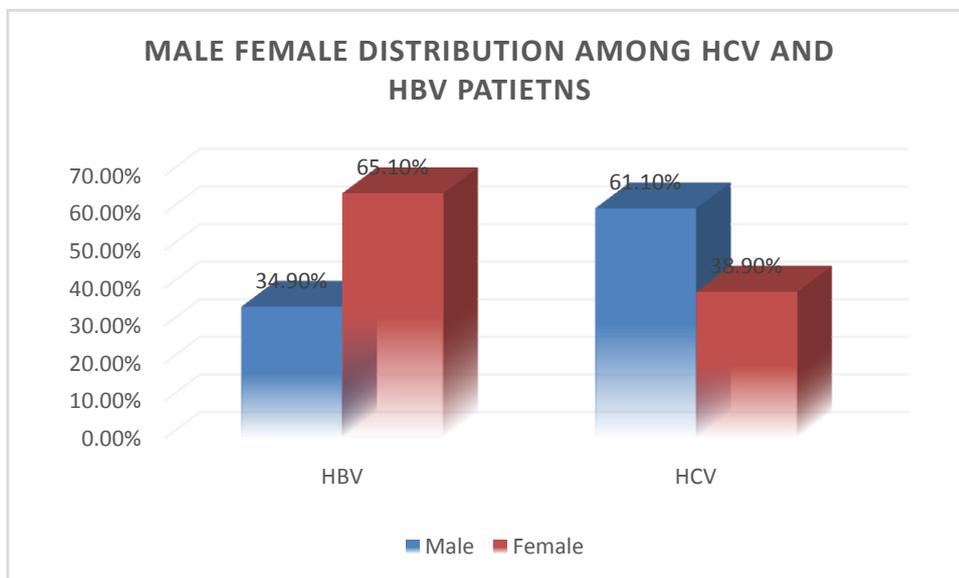


Figure 1 shows the graphical abstract and characteristics of the included patients



**Figure 2 Distribution of different age groups between HCV and HBV infected individuals**



**Figure 3 Shows Gender wise distribution among HCV & HBV infected patients**

**Table 1 shows the cross tabulation of HCV & HBV among age groups**

Variables	Up-to 20 years	21-40	41-60	>60	P value
HCV	12 (33.3%)	17 (47.2%)	04 (11.1) %	03 (8.3%)	0.002
HBV	15 (34.1%)	16 (34.4%)	10 (22.7%)	3 (6.8%)	0.02

HCV, Hepatitis C virus. HBV, Hepatitis B virus

## Discussion

Hepatitis is the inflammation of liver cells mostly caused by hepatitis C virus and Hepatitis B virus. The burden of this disease is still a global problem, loads of research have been done regarding this concern and still being done in different parts of the world to overcome this problem. In this part of the world, we are contributing and has been done a population-based study to know about the prevalence of HCV and HBV infection in Bajaur Pakistan. In addition, the importance of other factors like gender and age group were also reported previously to overcome this problem. Discussing our result in the likes of gender factor; the male was more prevalent than female between HBV and HCV infection (29(34.9%), 22(61.1%) vs 15(65.1%) and 14(38.9%), respectively).

Compare to previous studies which is similar to our study published in 2014 Basit et al, the frequency of male was high than female (11). Another study was conducted, in which the frequency of male and female was 16.5% and 1% respectively (37). Similarly, A Study was conducted in our nearest district by Sheikh et al at district Mardan, Khyber Pakhtunkhwa Pakistan which is in the line of our study as well and the frequency of male is higher than female was reported (38). As we mentioned many studies findings are like our study results, the reason we found the prevalent male proportion than female is that, using predisposing factors like, sharp equipment, and get inflamed with more visits to the barber shop. In addition, another factor could be the factor for producing this infection in male is many other has sex fellow and adopt unsafe mate.

The second factor influencing we putted in this study in the acquiring of HBV and HCV infection was age factor. In our study the age group range from 21-40 years were significantly contributing to the attaining of HCV and HBV infection (47.10% and 36.40%, respectively;  $p = <0.05$ ). A study was reported in Punjab Pakistan regarding the occurrence of HBV infection in different age groups in which the highest rate of HBV were 34.93% in age group 21-30, which was quite similar to our findings (39). Similarly, the occurrence of HCV infection was also higher in the age group ranges from 21-40 which was 47.10% and been compare with previous studies.

A study was conducted in the same province KPK in which the prevalent age group was 30-40 (26.4%) which is similar to our study (40). Conclusively, the age group ranges from 21-40 years are more prone to get HCV and HBV infection in this study as well as some previous studies. Moreover, discussing the prevalence of HCV & HBV infection, was 80 (8.0%) in which the HBV was more prevalent as 44(4.4%) than HCV infection 36 (3.6%). Finally, our result depicted the frequency of HBV infected patients were higher when compared to HCV infected patients. According to previous studies, a study was conducted by Ruba et al, the frequency of HBV infected patients was more than HCV as well. This study is also similar with some other studied had been conducted in Karachi and Lahore in term of HBV the dominant infection in this part of the world (25, 41). In the contrary, we also have some studies had been conducted in the same province and one study in the Punjab province, they have reported HCV as a prevalent infection than HBV infection (42). In this study, the patients have no complete information. As we discussed we had HBV the prevalent infection it may be transmitted from person to person by several ways such as unsterilized blood transfusion, reused needle or syringes, contaminated equipment, sexual contact, through parental transmission from mother to child, body fluid such as saliva, pus, inadequate sterilized medical devices and contaminated dental instruments play vital

role in the transmission of Hepatitis B virus infection(43).But the major route of transmission of HBV is by unscreened blood through transfusion and many laboratories do screen blood and transfer but in an improper way. According to world health organization, in Pakistan 1.5 million units of blood products transfused per year. 75% are replacement, 15 percent of blood is occupational donation while 10% are voluntary. A study was reported regarding to this concern, the frequency of hepatitis B infection in blood donor is 2.54% (34). Another study was conducted, the occurrence of hepatitis B in blood donor is 3.1%(44). Hepatitis B virus also does affect the doctors, Paramedical staff,and health care workers in the time of surgical practices and these peoples may deal with hospital acquiring blood borne disease from these patients on whom they operate. Surgeon has high risk than another specialist.According to the previous report, injuries have been estimated to occur in approximately 7% of operation and as many as 87% of surgeon are estimated to experience a percutaneous cut, prick or injury at same point in their careers(45). Health care workers and paramedic staff have more risk for hepatitis B infection. The rate of hepatitis B virus between the health providing people in other hospital northern parts of Tanzania was 70%(46).

### Conclusion

The prevalence of HBV was 4.4% while the HCV prevalence rate were 3.6% in the Bajaur Agency.Gender Factor influencing HCV and has moremales than females, because male are more expose to HCV transmitting incidences like using shaving blades and other sharp things during workplaces. Age group 21-40 individuals had been greatly influenced by both the HCV and HBV infection in equal contribution,the main reason of these differences of HBV with other age groups could be the sexual transmission of HBV whereas, the HCV may be the using of shaving blades and these age group of people are there every time to do work to meet their daily expenses and thus more prone and chance to get this virus.

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