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EPIDEMIOLOGICAL STUDY OF VIRAL HEPATITIS B AND C IN GENERAL POPULATION OF DISTRICT BANNU KHYBER PAKHTUNKHWA (KP), PAKISTAN

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Abstract

The epidemiology of HBV and HCV infections varies with geographic contexts, as do socioeconomic status, genotypic dispersion and impacted by a number of risk factors. The current study was conducted during January 2024 to August 2025 in the department of Pathology Khalifa Gul Nawaz (KGN) teaching hospital township Bannu, for the assessment of epidemiological study of HBV and HCV in district Bannu. In the present study total of 2149 samples were screened, among these 549 (25.54%) were HBV and 1600 (74.46%) were HCV. In HBV 132 (24.04%) were tested positive, while in HCV 400 (25.0%) were tested positive. Further, high prevalence was recorded in males 90(28.6%) compared to females 42(17.9%). In HBV, the age group 1-20 years and age group 41-60 years for HCV were more susceptible to the both infections. The study showed a higher prevalence in rural areas as compared to urban areas. Centrifugation was used to separate the serum from the corresponding blood samples for 10 minutes at 5000 rpm. The serum were examined for the presence of anti-HBsAg and anti-HCVcAg and other substances such HBsAb, HBeAb, HBc AB and anti-HCVcAg or CORE antigen. There is a terrible need to enhance the hepatitis awareness, founding of vigorous hepatitis immunization, hepatitis micro elimination programs comprising district Bannu by government of Pakistan.

Keywords: Blood, Infection, Hepatitis, Cirrhosis, Liver, Transfusion, RNA virus.

Introduction

Blood borne viral infections like hepatitis B (HB) and hepatitis C (HC) greatly increase the morbidity, mortality and financial burden of liver-related illnesses globally (Saraceni & Birk, 2021). The double stranded DNA virus known as hepatitis B virus (HBV) affects around 4.55 million persons in Pakistan. In contrast, 8.74 million people in Pakistan suffer from the single stranded RNA virus known as the hepatitis C virus (HCV) (Aasia et al., 2023). Both viral illnesses are concerning from a pathology standpoint because they might progress to liver cirrhosis and hepatocellular cancer. Approximately, 1.34 million fatalities worldwide are attributed to both viral illnesses (Mahtab et al., 2022). About 90% of children have hepatitis and children are more likely to get this condition. The prevalence of HBV and HCV infections varies with geographic contexts, as do socioeconomic status and genotypic dispersion (WHO, 2017).

Hepatitis virus epidemiology is complicated and impacted by a number of risk factors. In developed nations, needle stick injuries, intravenous drug use, blood transfusions, sexual

contact, maternal exposure and tattoos are the main ways that the disease is spread. However, 816 million HBV and 2–5 million HCV infections are caused by the use of unsterilized medical equipment, especially contaminated injections in underdeveloped nations like Pakistan (Yang et al., 2020; Hussain and Ali, 2016). The incidence of HB and HC was 3 million in 2019 alone, resulting in 1.1 million fatalities from cancer and liver disorders caused by HB and HC (Olaru et al., 2023). With 9.31 million HCV positive people in Pakistan, HC represents a bigger hazard (Mooneyhan et al., 2023). The Polaris Observatory reports that the prevalence of HB and HC in Pakistan's general population is 2% and 4%, respectively. Only 28% of people with HBV are diagnosed and only 3% of them receive treatment, despite the substantial disease burden. Consequently, HB is responsible for about 10,667 deaths in the nation each year (CDAF, 2025). In a similar vein, just 21% of those with HCV are diagnosed and only 2% receive treatment, which results in an estimated 37,419 deaths annually. These figures demonstrate how urgently Pakistan needs better methods for hepatitis screening, diagnosis, and treatment (CDAF, 2025). The purpose of the current study was to investigate the epidemiological survey of viral hepatitis B and C in district Bannu KP, Pakistan.

Materials and Methods

Study Area

The district of Bannu, which lies diagonally between latitudes 31.28^0 North and longitudes 73.25^0 East, was the site of the study. It is situated in the southern region and borders the districts of Lakki Marwat, Karak and North South Waziristan Agencies. A total of 1227 square kilometers make up district Bannu, of which 74196 hectors are cultivated. Winter temperatures are lower (6 °C), whereas summer temperatures are greater (48 °C).

Blood Sample Collection

The current study was conducted during January 2024 to August 2025 in the department of Pathology Khalifa Gul Nawaz (KGN) teaching hospital township Bannu, to analyze the epidemiology of hepatitis B &C in district Bannu. Each patient had 5 milliliters (ml) of blood drawn using a disposable syringe and putted in Ethylene Diamine Tetra acetate (EDTA) tube for further analysis. Centrifugation was used to separate the serum from the corresponding blood samples for 10 minutes at 5000 rpm. The serum were examined for the presence of anti-HBsAg and anti-HCVcAg and other substances such HBsAb, HBeAb, HBc AB and anti-HCVcAg or CORE antigen.

ICT Diagnosis

The samples were diagnosed by ICT (Accurate Diagnostics USA) in accordance with the manufacturer's instructions.

Enzyme link immune sorbent assay (ELISA) kit diagnosis

ELISA kits were used for further screening of the samples using Antic UK's HBsAg and anti-HCVcAg Sandwich ELISA kits.

Statistical Analysis

The collected data was analyzed using the Statistical Package for Social Sciences (SPSS version 20.0). When the P value was less than $p \leqslant 0.05$, a chi square test was used to compare the minimum level of significance.

Results

In the present study total of 2149 samples were screened, among these 549 (25.54%) were HBV and 1600 (74.46%) were HCV shown in figure 1.

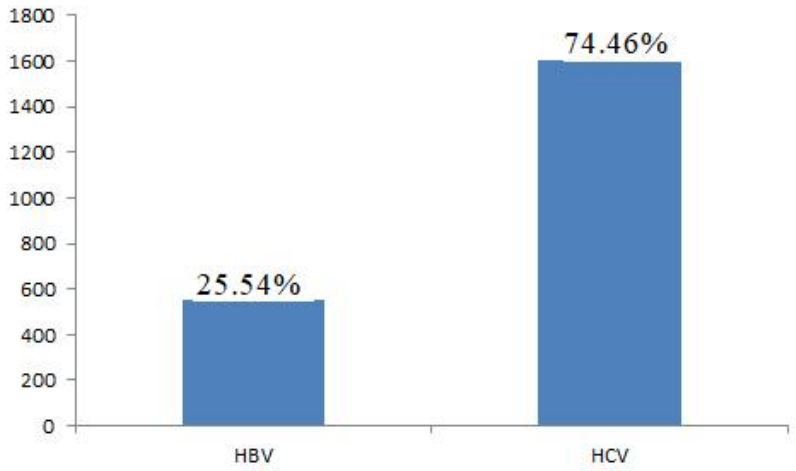

Figure 1: Current status of HBV and HCV with percentile range.

In HBV 132 (24.04%) were tested positive, while 417 (75.96%) were negative. Similarly in HCV 400 (25.0%) were tested positive, while 1200 (75.0%) were negative. The overall prevalence of infection across the combined samples were 532(24.79%), (75.21%) respectively shown in table 1.

Table 1: *Current status of HBV and HCV with negative and positive cases.*

	HBV		HCV	
	Positive	Negative	Positive	Negative
	132(24.04%)	417 (75.96%)	400 (25.0%)	1200 (75.0%)
Total Positive	532 (24.79%)		532 (75.21%)	
Total Negative	1617(25.78%)		1617 (74.21%)	

Gender wise distribution revealed that the higher prevalence was recorded in males 90(28.6%) compared to females 42(17.9%) out of 132 cases for HBV. Similarly, a high prevalence in females were 250(27.8%), whereas in males showed at the range of 150

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(21.4%) out of 450 for the HCV. Both in males and females were recorded (P=0.172). In age wise distribution, all the patients' ages were divided in to four categories. The number of cases for both HBV and HCV was observed in the 01-20 age years followed by the 21-40 years group, then 41-60 and 61-70 age years respectively. Overall, HCV cases were recorded higher than HBV cases in all age's groups. For all ages the p value was recorded (P=0.31) respectively. The HBV has cleared clinical symptoms as compared to the HCV. In economic status the poor category was more susceptible to the infection. The infection was more prevalent in poor hygienic condition as compared to the good one shown in table 2.

Table 2: *Gender and age wise distribution of HBV and HCV by using statistical tools.*

Variable	Category	HBV			HCV			
		N	-ive (%)	+ive (%)	N	-ive (%)	+ive (%)	p-value
Gender	Male	315	225 (71.4%)	90 (28.6%)	700	550 (78.5%)	150 (21.4%)	0.172
	Female	234	192 (82.1%)	42 (17.9%)	900	650 (72.2%)	250 (27.8%)	
Age (Years)	1-20	170	125 (73%)	45 (26%)	200	174 (87%)	26 (13%)	0.31
	21-40	110	93 (84%)	17 (15%)	500	400 (80%)	100 (20%)	
	41-60	129	97 (75%)	32 (24%)	600	450 (75%)	150 (25%)	
	61-70	140	102 (72%)	38 (27%)	300	123 (41%)	177 (59%)	
			+ive (%)			+ive (%)		0.04*
Hygienic condition	Poor	405	77 (19.0%)		1200	250 (20.83%)		
	Good	144	55 (38.19%)		400	150 (37.5%)		
Economic status	Poor	150	57 (38.0%)		450	216 (48.0%)		<0.01*
	Middle	300	45 (15.0%)		900	138 (15.3%)		
	Rich	99	30 (30.3%)		250	46 (18.4%)		
Clinical features	Fatigue		Yes		No			
	Jaundice		No		Yes			
	Nausea		No		No			
	Dark urine		Yes		No			
	Abdominal pain		Yes		Yes			

N: Number; +ive: Positive; -ive: Negative.

The locality wise distribution of HBV&HCV showed a higher prevalence in rural areas as compared to urban areas. In rural areas, 93 (70%) and in urban areas, 39(30%) samples were considered positive for HBV. Similarly, for HCV 339 (75%) was recorded in rural areas and 114(25%) samples were in urban areas shown in figure 2.

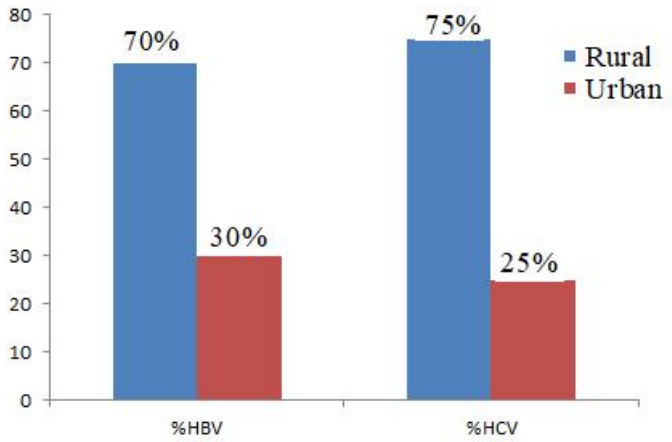

Figure 2: Current status of HBV & HCV on the basis of locality.

Discussion

The epidemiology of HBV and HCV infections varies with geographic contexts, as do socioeconomic status, genotypic dispersion and impacted by a number of risk factors. In the present study total of 2149 samples were screened, among these 549 (25.54%) were HBV and 1600 (74.46%) were HCV. In HBV 132 (24.04%) were tested positive, while in HCV 400 (25.0%) were tested positive. Further, high prevalence was recorded in males 90(28.6%) compared to females 42(17.9%). In HBV, the age group 1-20 years and age group 41-60 years for HCV were more susceptible to the both infections. The study showed a higher prevalence in rural areas as compared to urban areas.

In the same district, Khan (2020) did a study that revealed 213 positive patients for both HBV and HCV. Males are more common overall (149 or 70%). The age group < 5 years produced the lowest share (4.2%) of the both hepatitis, while the age group 15-30 years supplied the most shares, at 54.3%. Additionally, the majority of cases 71 or 33.3% were reported in December. HBV was more common than HCV across all age categories. Nazir et al., (2025) carried out another investigation in the same district, looking at 385 samples. Of these, 12 (3.12%) were found to be positive for both HBV and HCV, while 102 (46.49%) were found to be positive for HCV. In rural areas, HBV was found in 5 individuals (3.45%) and HCV in 42 individuals (28.97%). In both urban (25.0% vs. 2.9%) and rural (28.9% vs. 3.5%) populations, HCV was more common than HBV. In

another study, Khan et al., (2022) looked at 1055 samples in the Peshawar district; 442 of these samples were positive for HCV.

Shazia et al., did a second investigation in Karachi in 2023 that looked at 332 samples in total. Of these, 48 (14.5%) had HCV and 68 (20.5%) had HBV. Sindh had the greatest prevalence of HBV and HCV (7%), followed by KPK (6.6%), Punjab (5.6%), Baluchistan and FATA, which had lower rates. In addition to characterizing the genotypic distribution, high-risk and low-risk populations were statistically determined. Zahoor et al., 2021 investigation in the Gujranwala district found that 715 (1.08%) of the samples were positive for HBV and 1846 (2.78%) for HCV. Additionally, the study projected that the rates of HBV and HCV will be 3.25% and 6.36%, respectively, by 2030. Waheed et al., study from 2025 looked at 550 samples that were taken from the refugee community in Muzafarabad, Pakistan. For HBsAg and anti-HCV, the overall seroprevalence was 32/550 (5.82%) and 26/550 (4.73%) respectively. Females had higher seroprevalence of HBsAg and anti-HCV 15/245 (6.12%) and 16/245 (6.53%) respectively, than males 17/305 (5.75%) and females 10/305 (3.28%). Din et al., (2024) carried out a study in Pakistan Dera Ismail Khan District (D.I. Khan). HBV and HCV prevalence was 25.72% overall. 228 (29%) people had HBV, with males having a greater frequency (34.31%) than females (19.20%) in the 16–30 age groups (43.17%). HCV was found in 92 people (20.08%), with males (22.05%) more affected than females (17.43%) and the greatest prevalence (27.82%) in the 46–60 age range.

Conclusion

The study's findings indicate that HBV and HCV remain significant public health concerns in the region, with HCV having a higher overall prevalence across all demographic groups. Men are more susceptible to HBV, while women have a higher positive incidence for HCV. The highest infection rates were found in the youngest age group (01–20 years), which is quite alarming because it indicates early exposure and the critical need for pediatric and adolescent screening programs. Additionally, the disproportionately high disease burden in rural areas compared to urban places highlights a gap in healthcare equality. These findings suggest that public health initiatives in district Bannu should concentrate on rural areas in order to successfully stop the development of these viral diseases. The disproportionately high disease burden in rural areas compared to urban places highlights a gap in healthcare equality. These findings suggest that public health initiatives in district Bannu should concentrate on rural outreach, maternal and child health education and focused immunization and awareness campaigns for young people in order to successfully stop the development of these viral diseases.

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