

Original Article

Cultural practices and pediatric hepatitis transmission: A study of HBV and HCV prevalence in Rural Sindh, Pakistan.

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Doi: 10.29052/IJEHSR.v13.i1.2025.28-36

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Received 11/11/2024

Accepted 25/01/2025

First Published 04/02/2025



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Abstract

Background: Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) are significant public health concerns in rural Pakistan, where limited healthcare access, low vaccination rates, and insufficient awareness contribute to ongoing transmission. If untreated, these infections can lead to serious liver complications, including cirrhosis and hepatocellular carcinoma. This study aimed to determine the prevalence of HBV and HCV among children in rural District Sanghar, Sindh, Pakistan, and to identify associated risk factors.

Methodology: A cross-sectional study was conducted in three Union Councils (Shehdadpur, Sinjhor, and Sanghar Taluka) of District Sanghar. A total of 1,123 children aged 4 to 9 years were screened for HBV and HCV using immuno-chromatographic (ICT) rapid strip tests. Data on hepatitis B vaccination status, parental education, and participation in traditional mourning rituals were collected through structured interviews. Statistical analyses, including chi-square tests and logistic regression, were used to identify significant associations.

Results: Of the 1,123 children screened, 76% (n=854) were male and 24% (n=269) were female. Overall, 15 children (1.3%) tested positive for hepatitis, with HBV accounting for 73% (n=11) and HCV for 27% (n=4). Higher infection rates were observed among male children. Participation in traditional mourning rituals involving shared sharp instruments was frequently reported among infected cases. Additionally, low hepatitis B vaccination coverage and parental illiteracy were identified as significant contributing factors to infection risk.

Conclusion: The study highlights the ongoing transmission of HBV and HCV among unvaccinated children in rural Sanghar, driven by inadequate vaccination coverage, limited parental education, and high-risk cultural practices. Targeted public health interventions, including expanded immunization programs and culturally sensitive community education, are essential to reduce hepatitis transmission in these vulnerable populations.

Keywords

Hepatitis B Virus, Hepatitis C Virus, Child Health, Cultural Practices, Rural Ppopulation



Introduction

Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) are significant global public health challenges, particularly in low- and middle-income countries where limited healthcare access and inadequate preventive measures contribute to their widespread transmission. According to the World Health Organization (WHO), approximately 296 million people live with chronic HBV infection and around 58 million with chronic HCV infection worldwide, both contributing substantially to liver-related morbidity and mortality through complications such as cirrhosis and hepatocellular carcinoma^{1,2}. While HBV prevention efforts have benefited from the availability of effective vaccines, HCV remains a persistent concern due to the lack of a vaccine and its typically asymptomatic progression, delaying diagnosis and treatment³.

Pakistan bears one of the highest burdens of hepatitis globally, with reported prevalence rates of 2.5%–4.5% for HBV and 4.7%–8.5% for HCV⁴. Several factors drive the continued spread of these infections, including unsafe medical practices, reuse of syringes, inadequate sterilization of surgical and dental instruments, and certain cultural traditions⁵. While previous research has predominantly focused on adult populations, there is limited understanding of hepatitis transmission dynamics among children, particularly in rural areas where healthcare awareness, vaccination coverage, and infection control practices remain insufficient⁶.

A particularly under recognized risk factor in such communities involves participation in traditional mourning rituals. These cultural practices, common in rural regions of Pakistan, often involve the communal use of sharp instruments like blades and razors, which are shared among participants without proper sterilization. This increases the risk of transmitting blood borne infections, including HBV and HCV, not only among adults but also children who may be present or involved in these ceremonies⁷. Despite the public health implications of these practices, limited research has explored their contribution to hepatitis transmission in pediatric populations.

This study aims to assess the prevalence of HBV and HCV infections among children in rural areas of District Sanghar, Sindh, Pakistan, and to identify key risk factors associated with transmission, including vaccination status, parental education, and exposure to high-risk cultural practices. By addressing these gaps, this research seeks to inform evidence-based prevention strategies and community-level interventions to reduce hepatitis transmission among vulnerable pediatric populations in high-risk regions.

Methodology

Study Design

This study employed a cross-sectional design to assess the prevalence of Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) among children residing in selected rural areas of District Sanghar, Sindh, Pakistan. In addition to determining the prevalence rates, the study aimed to evaluate the participants' awareness regarding risk factors associated with hepatitis infections. The cross-sectional approach enabled the collection of data at a single point in time, providing a snapshot of the health status and awareness levels within the target population.

Ethics

Ethical approval for the study was obtained from the institutional ethical review board, ensuring compliance with the principles outlined in international biomedical research guidelines involving human subjects. Prior to participation, informed consent was obtained from the parents or legal guardians of each child. They were fully briefed on the study's objectives, procedures, and potential risks. Participation was entirely voluntary, and individuals retained the right to withdraw from the study at any stage without facing any consequences. The confidentiality and anonymity of all participants were rigorously maintained throughout the research process.

Setting

The study was conducted in rural regions of District Sanghar, located in the Sindh province of Pakistan. Specifically, data collection took place in the Union Councils (UCs) of Shehdadpur, Sinjhor, and

Sanghar Taluka. These areas were selected due to their socio-economic vulnerabilities, limited access to healthcare services, and the increased potential for hepatitis transmission due to inadequate public health infrastructure.

Participants

The study population comprised children between the ages of 1 and 13 years who had been living in the selected areas of District Sanghar for at least one year prior to the study. Eligibility criteria required that participants had no prior diagnosis of liver diseases unrelated to HBV or HCV and had not previously received treatment for hepatitis. Children were included only after obtaining written consent from their parents or legal guardians. This population was selected to represent vulnerable rural communities where health education and access to preventive services may be limited.

Variables

The primary outcomes of interest in this study were the prevalence rates of HBV and HCV among the participating children. Independent variables included demographic factors (such as age and gender), socio-economic indicators, vaccination history, previous blood transfusions, family history of hepatitis infections, and personal hygiene practices, including the sharing of personal items such as razors and toothbrushes. The study also evaluated participants' awareness levels regarding common risk factors associated with HBV and HCV transmission.

Data Sources/Measurement

Data collection was conducted using a two-part approach involving both questionnaire administration and laboratory testing. Firstly, a structured questionnaire was developed to capture demographic details, medical history, vaccination records, potential risk factor exposure, and knowledge about hepatitis transmission. This tool was designed to ensure consistency in data collection and was administered by trained research staff fluent in the local language to facilitate clear communication with participants and their families.

Secondly, biological testing was conducted to detect the presence of HBV and HCV infections. For HBV, the Hepatitis B surface antigen (HBsAg) was identified using a rapid chromatographic immunoassay kit, which allowed for the qualitative detection of HBsAg in whole blood samples, providing results within minutes. For HCV, an immunochromatographic (ICT) kit method was employed to detect anti-HCV antibodies in plasma samples. This test used recombinant proteins and peptides from the core and structural regions of the HCV genome to ensure high sensitivity and specificity. All laboratory procedures were performed by qualified personnel according to the manufacturers' protocols to maintain reliability and accuracy.

Bias

To minimize potential biases, several strategies were adopted. Participant selection was randomized within the eligible population to avoid selection bias. Data collection procedures were standardized through the use of a validated questionnaire and training of field staff to ensure uniformity in administering interviews and recording responses. Laboratory testing followed strict adherence to protocol, and all samples were analyzed using the same testing kits to reduce measurement bias.

Study Size

The sample size was calculated based on an estimated prevalence of hepatitis in rural Pakistani populations, with a 95% confidence level and a 5% margin of error. Considering these parameters, a total of 1,123 children were enrolled in the study. This sample size was sufficient to achieve statistical power and reliability in estimating prevalence rates and exploring associated risk factors.

Statistical Methods

All data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 14.0. Descriptive statistics such as means, medians, and standard deviations were calculated for continuous variables, while categorical variables were summarized as frequencies and percentages. The chi-square test was employed to examine

associations between categorical variables and hepatitis infection status. Furthermore, logistic regression analysis was conducted to identify independent risk factors associated with HBV and HCV infections while controlling for potential confounders. A p-value of less than 0.05 was considered statistically significant in all analyses.

Results

Participants

A total of 1,123 children from rural areas of District Sanghar, Sindh, Pakistan, were screened for Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) infections. The sample included 854 males (76%) and 269 females (24%). Recruitment was conducted through local healthcare centers and school-based screening programs, with informed consent obtained from parents or guardians.

Descriptive Data

Among the screened population, 15 children (1.3%) tested positive for hepatitis infections, of which 11 (73%) were diagnosed with HBV and 4 (27%) with HCV. All HCV cases and the majority of HBV cases (n=9) occurred in male children, while 2 HBV cases were identified in females.

Vaccination coverage against HBV was low, with only 85 children (7%) vaccinated. None of the vaccinated children tested positive for HBV, suggesting a protective effect. A family history of hepatitis was reported by 446 children (51%). Most parents (82%) and mothers (54%) were uneducated or illiterate.

Regarding age distribution, 450 children (40%) were aged 5–8 years and 673 (60%) were aged 9–12 years. Educational status varied, with 35% enrolled in primary school, 47% in middle school, and 17% not attending school.

Outcome Data

The overall prevalence of hepatitis infection was 1.3%, with HBV being more common than HCV.

Geographically, Sinjhora reported the highest number of cases (5 HBV, 2 HCV), followed by Sanghar and Shahdadpur.

Gender-based analysis showed a significant difference, with infections more frequent in males ($p < 0.01$). A significant association was also found between vaccination status and infection, as no vaccinated child tested positive for HBV and only one vaccinated child tested positive for HCV ($p < 0.01$).

Main Results

Among the 11 HBV-positive children, the most frequently reported risk factor was syringe use within the past six months, observed in 10 cases. This was followed closely by barber shaving practices, reported by 9 HBV-positive children.

Mourning rituals were another notable risk factor, with 4 HBV-positive children participating in such events. Circumcision within the past six months was reported by 1 HBV-positive child, along with single cases of blood transfusion and surgery history. Piercing by unprofessional individuals was also noted in 1 HBV-positive child, whereas no HBV-positive cases were linked to professional piercing.

For the 4 HCV-positive children, syringe use was also a major risk factor, reported in 3 cases. Barber shaving was similarly prevalent among HCV-positive children, with 3 reporting exposure.

Additionally, 1 HCV-positive child participated in mourning rituals, and another had undergone circumcision within the past six months. Piercing by unprofessional individuals was reported in 1 HCV-positive case. There were no reports of blood transfusion, surgery history, or professional piercing among the HCV-positive group.

No adverse events or complications were recorded during the screening or data collection phases of the study.

Table 1: Demographic characteristics of the study participants.

Variables		n (%)
Gender	Male	854 (76.0)
	Female	269 (24.0)
Age	5–8 years	450 (40.1)
	9–12 years	673 (59.9)
Child Education Level	Primary	394 (35.1)
	Middle	528 (47.0)
	Not in School	201 (17.9)
Father Education Level	Illiterate	332 (29.6)
	Primary	466 (41.5)
	Secondary	201 (17.9)
	Higher Education	124 (11.0)
Mother Education Level	Illiterate	613 (54.6)
	Primary	322 (28.7)
	Secondary	178 (15.9)
	Higher Education	10 (0.9)

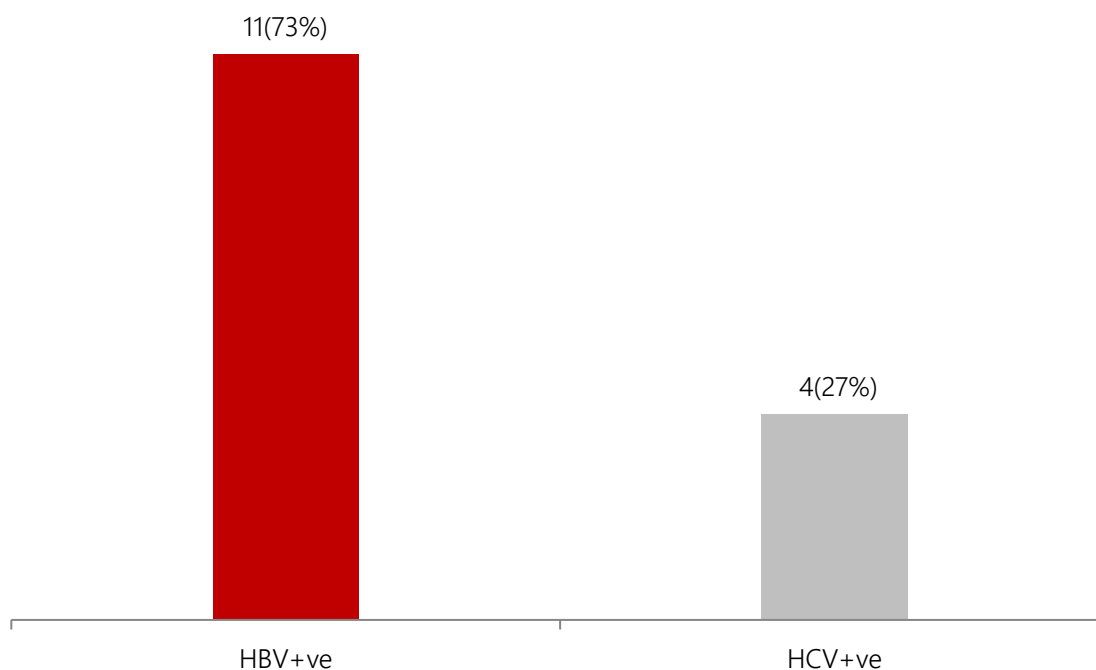
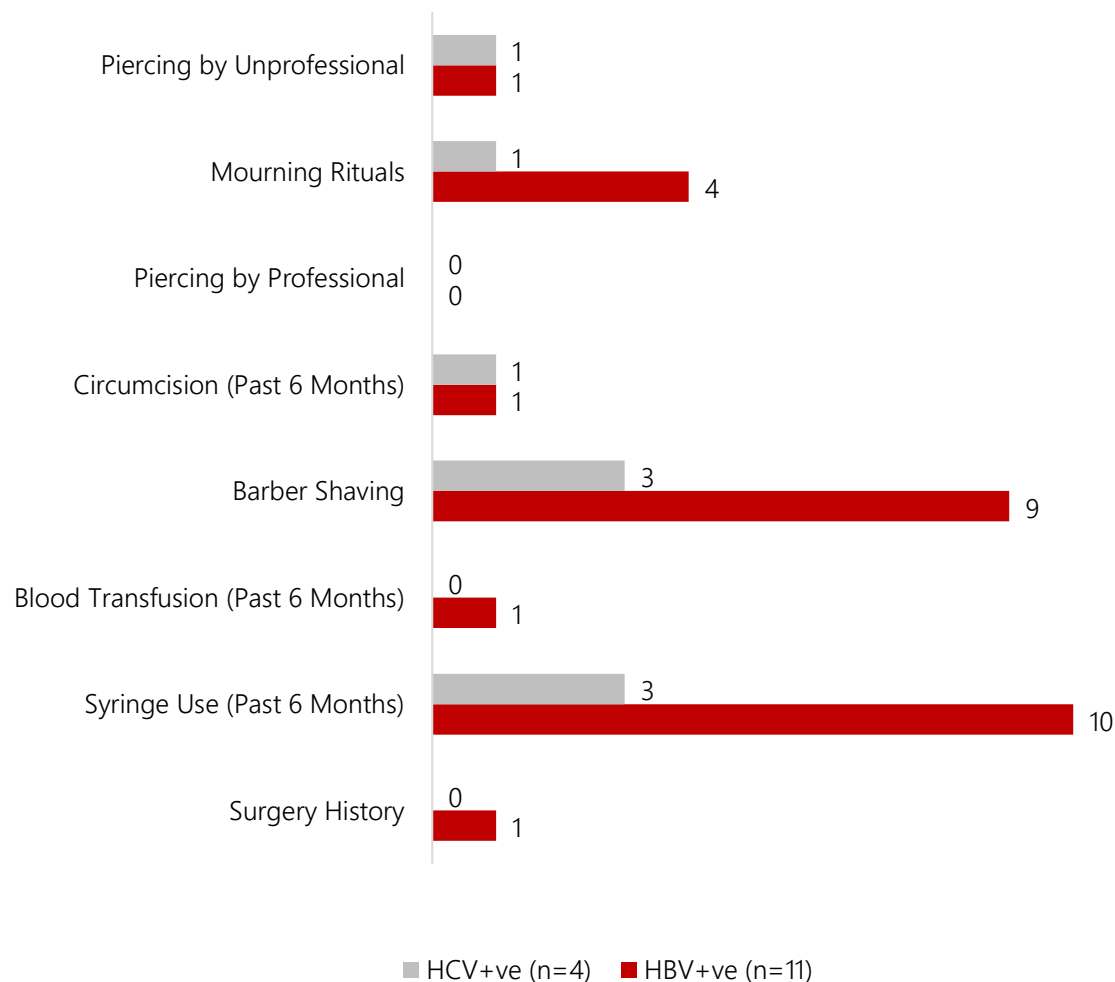
**Figure 1: Frequency of Hepatitis B and C Infection.**

Table 2: Distribution of Hepatitis B and C positive cases by demographic characteristics among children in District Sanghar, Sindh.

Variables		HBV+VE (n=11)	HCV+VE (n=4)	p-value
Gender	Male	9(81.8)	4(100)	<0.01*
	Female	2(18.2)	-	
Vaccination Status	Yes	1(9.1)	1(25)	<0.01*
	No	10(90.9)	3(75)	<0.01*
Taluka	Sanghar	3(27.3)	1(25)	0.06
	Sinjhor	5(45.5)	2(50)	
	Shahdadpur	3(27.3)	1(25)	

Chi-square/Fisher's Exact Test was applied. *A p-value of <0.05 was considered statistically significant.

**Figure 2: Comparison of Hepatitis B and C positive cases by associated risk factors among children in District Sanghar, Sindh.**

Discussion

Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections pose a significant burden in unvaccinated children, particularly in developing countries. The overall prevalence of HBV infection among the screened children was 1.3%, with HBV accounting for 73% of cases and HCV for 27%. These figures reflect a concerning burden of viral hepatitis within the pediatric population, emphasizing the persistent threat posed by HBV, despite the availability of effective vaccines. Alarming, only 7% of the children in this study had received the HBV vaccine, leaving the vast majority (93%) unprotected and at heightened risk of infection. Studies in Pakistan revealed HCV prevalence of 1.88% and HBV prevalence of 0.8% among children⁸. Risk factors include exposure to infectious healthcare waste, unhygienic dental procedures, and circumcision⁹. In Egypt, HCV prevalence was 4.7% among children, with blood transfusion being the most predictable risk factor¹⁰. Vertical transmission from infected mothers is a common mode of infection in children¹¹. While HBV vaccination has reduced incidence, some vaccinated children still develop infections⁸. For HCV, where no vaccine exists, treatment focuses on direct-acting antiviral agents¹¹. Regular screening, preventive education, and booster doses of HBV vaccine are recommended to enhance protection in endemic areas^{9,10}.

A notable gender disparity was observed, with male children demonstrating a higher infection rate than females. While the underlying reasons for this difference remain unclear, several factors may contribute. Boys in rural settings may be more frequently exposed to high-risk practices, such as unsterile barbering, traditional male circumcision, and increased participation in communal mourning rituals, all of which involve the use of shared sharp instruments. Our findings are also supported by other Pakistan and Indian studies, males consistently show higher infection rates than females across studies¹²⁻¹⁴. Common risk factors include unsafe blood transfusions, razor sharing in barbershops, and traditional circumcision practices^{12,13}. Socioeconomic status also plays a role, with higher infection rates among lower-

income groups^{12,15}. Community exposures, such as sharing smoking equipment and getting piercings, contribute more to infections than healthcare exposures¹⁵. In tribal communities, cultural practices like tattooing and communal shaving significantly increase transmission risk¹⁴.

Socioeconomic factors also appear to influence hepatitis transmission. In this study, a striking 82% of infected children came from households where parents had no formal education. Although the association between socioeconomic status and infection rates did not reach statistical significance, the observed trend suggests that lower parental education levels may contribute to higher infection risks, likely due to reduced health literacy, limited awareness of preventive measures, and restricted access to quality healthcare services. Zhang et al., and Ismail et al., reported that lower parental education levels are associated with higher infection risks in children, likely due to reduced health literacy and limited awareness of preventive measures^{16,17}. A study in Kenya found that hepatitis A seroprevalence was significantly higher among children from low socioeconomic backgrounds compared to those from higher socioeconomic status¹⁸. Factors such as crowded households, rural residence, and limited access to quality healthcare services contribute to increased hepatitis risk^{17,18}.

These findings reinforce the critical importance of expanding public health interventions aimed at increasing HBV vaccination coverage, particularly in rural areas. Strengthening school-based immunization programs, ensuring the availability of vaccines at primary healthcare centers, and promoting safe medical and cultural practices are essential steps toward reducing the burden of HBV and HCV. Additionally, community education campaigns tailored to address local cultural practices such as communal mourning rituals could play a vital role in mitigating high-risk behaviors and breaking the chain of transmission.

Limitations

This study has several limitations that should be considered. Its cross-sectional design prevents establishing causal relationships between risk

factors and hepatitis infections, while the limited sample size may reduce the generalizability of findings to the wider pediatric population. Reliance on self-reported data for vaccination status and socioeconomic factors introduces potential recall bias, and the lack of molecular testing restricts the ability to confirm active infections and identify viral genotypes. Additionally, the absence of maternal HBV and HCV screening data limits insights into vertical transmission, and sensitive risk behaviors, such as participation in traditional practices involving shared sharp instruments, may have been underreported due to social desirability bias. Lastly, without long-term follow-up, the study cannot assess disease progression or chronic health outcomes. Future research should address these gaps through longitudinal designs, molecular diagnostics, and comprehensive maternal screening to provide a clearer understanding of HBV and HCV transmission and impacts in children.

Conclusion

This study highlights the ongoing burden of Hepatitis B (HBV) and Hepatitis C (HCV) infections among children, particularly in rural areas with low vaccination coverage. The high prevalence of HBV in unvaccinated children emphasizes the urgent need to strengthen universal immunization programs and improve public health interventions. Findings suggest that horizontal transmission, through close contact and unsafe cultural practices like communal mourning involving shared sharp instruments, plays a major role in HBV spread among children, rather than vertical transmission from mother to child. Additionally, socioeconomic factors such as low parental education and limited healthcare access contribute to increased infection risk, while higher infection rates observed in male children indicate possible gender-related exposure differences that require further investigation. These results call for integrated strategies focusing on expanded vaccination, community education, and the promotion of safe practices to reduce hepatitis transmission in high-risk pediatric populations.

Conflicts of Interest

The author(s) have no conflicts of interest.

Acknowledgement

The author(s) would like to express their sincere gratitude to all the study participants for their valuable cooperation and contribution to this research.

Funding

None.

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