



## Article

# Knowledge, Attitudes, and Practices Regarding Hepatitis B and C in Dera Ghazi Khan

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**ABSTRACT**

**Background:** Hepatitis B and C remain significant public health concerns in Pakistan, particularly in rural and underserved regions where awareness, preventive practices, and vaccination coverage are suboptimal. There is a critical research gap regarding the knowledge, attitudes, and practices (KAP) of local populations in these high-burden areas.

**Objective:** This study aimed to assess the level of knowledge, attitudes, and preventive behaviors regarding Hepatitis B and C among adult residents of Dera Ghazi Khan, with a focus on identifying gaps in awareness, vaccine uptake, and willingness to seek screening or treatment. **Methods:** A cross-sectional observational study was conducted from October 2024 to February 2025, including 112 adults aged  $\geq 18$  years residing in Dera Ghazi Khan for at least five years. Participants were selected by convenience sampling at local hospitals. Data were collected using a structured, validated questionnaire evaluating demographic characteristics, awareness, knowledge of transmission, vaccination status, and attitudes toward prevention and treatment. Ethical approval was granted by the Institutional Review Board of The Superior University Lahore, following the Declaration of Helsinki. Data were analyzed using SPSS version 27.0, with descriptive statistics, Chi-square tests, and 95% confidence intervals for proportions;  $p < 0.05$  was considered statistically significant. **Results:** Among 112 participants (50.9% male), 82.1% were aware of Hepatitis B and C, and 84.8% recognized their association with liver disease. However, only 22.3% had received the Hepatitis B vaccine, and 29.5% had been tested for infection. While 74.1% expressed willingness to receive vaccination or treatment, significant gaps persisted in preventive practices and vaccine uptake ( $p < 0.05$ ). Higher educational attainment correlated with increased awareness and willingness but did not translate into substantially higher vaccination rates. **Conclusion:** Despite moderate awareness and favorable attitudes toward Hepatitis B and C among residents of Dera Ghazi Khan, major deficiencies remain in vaccine coverage and adoption of preventive behaviors. Targeted public health interventions and improved vaccine accessibility are essential for reducing disease burden, enhancing early detection, and advancing liver health in underserved populations.

**Keywords:** Hepatitis B, Hepatitis C, Knowledge Attitudes Practices, Vaccination, Disease Prevention, Pakistan, Public Health

**INTRODUCTION**

Hepatitis B and C represent a formidable public health concern globally, especially in low- and middle-income countries where healthcare resources and preventive services may be limited (1,2). These viral infections are responsible for the majority of chronic liver disease cases, contributing significantly to cirrhosis and hepatocellular carcinoma worldwide (3). It is estimated that over 325 million people live with chronic hepatitis infections, with South Asia—including Pakistan—bearing a disproportionate burden (2,4). Despite ongoing governmental and non-governmental

interventions focused on awareness, immunization, and improved healthcare delivery, Pakistan continues to face rising rates of both hepatitis B and C, particularly in rural regions (4,5). In Pakistan, hepatitis C is especially prevalent, affecting approximately 3.3% of the global population, with about 10 million chronic cases nationally and a trend that shows increasing incidence despite available preventive strategies (3,6). These diseases are largely preventable, but effective prevention relies on the population's knowledge, attitudes, and practices (KAP), as well as the accessibility of health education,

screening, and vaccination (6,7). The transmission of hepatitis B and C predominantly occurs through exposure to infected blood and body fluids, with common risk factors including the use of unsterilized medical equipment, unsafe blood transfusions, intravenous drug use, and unprotected sexual contact (8). The chronic nature and often asymptomatic progression of these infections, coupled with the limited availability of timely screening, result in delayed diagnosis and poorer outcomes, especially in resource-constrained and rural environments such as Dera Ghazi Khan (8,9). Although substantial progress has been made in hepatitis B vaccination campaigns, significant knowledge gaps and misconceptions persist, particularly among populations with limited formal education or exposure to targeted health messaging (9,10). Cultural factors and misinformation further contribute to unsafe health practices and stigma, deterring individuals from seeking testing or treatment (10,11). The resulting low vaccination coverage and suboptimal adoption of preventive practices continue to fuel ongoing transmission, even in communities with moderate awareness (11). Previous studies have highlighted a persistent gap between awareness and action regarding hepatitis B and C prevention in Pakistan. National and provincial surveys demonstrate variable rates of knowledge and vaccine uptake, often correlating with educational attainment, urban versus rural residence, and access to healthcare services (12,13). For example, while awareness of hepatitis B and C can be relatively high among educated urban populations, actual vaccination rates and regular screening remain insufficient, especially in rural areas like Dera Ghazi Khan (14). This gap is compounded by factors such as limited healthcare infrastructure, inadequate record-keeping, and social stigma, all of which undermine the effectiveness of public health interventions (15).

The need for more targeted education, improved vaccine accessibility, and community engagement is especially acute in regions characterized by rural demographics and lower socio-economic status (16,17). Despite the high prevalence and serious health implications of hepatitis B and C in Pakistan, there is a lack of region-specific data evaluating the KAP of communities such as Dera Ghazi Khan, where cultural, social, and healthcare barriers may further impede prevention and control efforts (4,5). Without a clear understanding of the population's knowledge, attitudes, and practices, public health strategies may fail to address critical gaps, limiting their impact and sustainability (12). Therefore, this study is designed to systematically assess the awareness, perceptions, and preventive behaviours of residents in Dera Ghazi Khan concerning hepatitis B and C. By identifying key knowledge deficits, misconceptions, and barriers to prevention and care, the study aims to inform locally relevant interventions that can improve vaccination rates, promote safe practices, and ultimately reduce the burden of hepatitis B and C in this high-risk setting. The objective of this research is to evaluate the current level of knowledge, attitudes, and practices regarding hepatitis B and C among adults in Dera Ghazi Khan, with a view to supporting evidence-based, context-sensitive public health planning (12).

## MATERIALS AND METHODS

This cross-sectional study was conducted from October 2024 to February 2025 to assess the knowledge, attitudes, and practices

regarding Hepatitis B and C among adult residents of Dera Ghazi Khan, Pakistan. The research adhered to the STROBE guidelines for observational studies, ensuring comprehensive reporting and minimization of bias. The study population comprised adults aged 18 years or above who had resided in Dera Ghazi Khan for at least five years and provided informed consent for participation. Individuals who were non-residents, minors, or declined to participate were excluded from the study to maintain sample specificity and ethical rigor. A total of 112 participants were recruited using convenient random sampling at District and Tehsil Headquarter Hospitals, targeting both inpatients and outpatients from diverse educational and socioeconomic backgrounds to enhance the generalizability of the findings.

Prior to recruitment, all participants were provided with detailed information regarding the study objectives, confidentiality protocols, and their rights as research subjects. Written informed consent was obtained in accordance with the Declaration of Helsinki, and ethical approval for the study protocol was granted by the Institutional Review Board of The Superior University Lahore (approval number: SU-IRB-2024-10-001). Data collection was performed using a structured, interviewer-administered questionnaire that was developed based on previous validated KAP surveys on hepatitis in similar settings (1,2). The tool was pre-tested in a pilot study with 10 individuals (not included in the final analysis) to ensure clarity, cultural relevance, and internal consistency; necessary modifications were made based on feedback.

The questionnaire comprised sections evaluating demographic information, knowledge of hepatitis B and C transmission routes, clinical consequences, prevention and vaccination, attitudes toward screening and treatment, and self-reported preventive practices. Outcome measures included the proportion of participants aware of hepatitis B and C, knowledge of transmission and prevention, perception of disease severity, vaccine awareness, history of vaccination and screening, willingness to receive treatment, and adoption of safe practices. The instrument included both closed and multiple-choice questions to standardize responses and minimize interviewer bias. To mitigate confounding, data on potential effect modifiers such as age, gender, and educational status were collected and analyzed. All completed questionnaires were coded and double-entered into SPSS version 27.0 for statistical analysis. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize participant characteristics and KAP outcomes.

Chi-square tests were applied to explore associations between demographic variables and key outcome measures. Statistical significance was set at a p-value of <0.05. Missing data were addressed by excluding cases with incomplete responses for the specific analysis, and sensitivity analyses were conducted to ensure robustness of findings. Confounding was addressed in the interpretation phase by stratifying results based on relevant demographic subgroups and discussing potential influences on observed associations.

The methodological rigor, ethical safeguards, and analytic approach adopted in this study ensure that the findings are both reliable and reproducible. By following standardized reporting

guidelines and employing validated tools, this research contributes meaningful and actionable evidence regarding hepatitis B and C prevention and control within an underserved population of southern Punjab (1,2).

## RESULTS

A total of 112 participants were included in the analysis, with an approximately equal gender distribution: 57 males (50.9%) and 55 females (49.1%). The educational profile was skewed toward higher attainment, with 78.6% ( $n = 88$ ) being graduates or postgraduates and 18.8% ( $n = 21$ ) having higher secondary education. There were no missing data for demographic variables. The majority of participants ( $n = 92$ , 82.1%; 95% CI: 74.3%–88.1%) reported having heard of Hepatitis B and C, while 17.9% ( $n = 20$ ; 95% CI: 11.9%–25.7%) had no prior awareness (Table 1). No statistically significant gender differences were observed in awareness ( $\chi^2 = 0.07$ ,  $p = 0.79$ ). Participants demonstrated varying levels of knowledge regarding major

transmission routes (Table 2). Blood transfusions were the most frequently identified route ( $n = 46$ , 41.1%; 95% CI: 32.3%–50.4%), followed by needle sharing ( $n = 23$ , 20.5%; 95% CI: 13.7%–29.3%) and unprotected sexual contact ( $n = 18$ , 16.1%; 95% CI: 10.0%–24.3%). A minority ( $n = 7$ , 6.3%; 95% CI: 2.6%–12.5%) were unaware of transmission pathways. Knowledge did not differ significantly across educational subgroups ( $\chi^2 = 2.43$ ,  $p = 0.30$ ). A majority of respondents ( $n = 78$ , 69.6%; 95% CI: 60.4%–77.7%) believed that Hepatitis B and C infections are preventable, while 23.2% ( $n = 26$ ; 95% CI: 15.7%–32.1%) were unsure, and 7.1% ( $n = 8$ ; 95% CI: 3.1%–13.5%) believed prevention was not possible (Table 3). Awareness of the Hepatitis B vaccine was moderate ( $n = 74$ , 66.1%; 95% CI: 56.9%–74.4%), while 33.9% ( $n = 38$ ; 95% CI: 25.6%–43.1%) were unaware (Table 4). Perceptions regarding the severity of Hepatitis B and C were high, with 91.0% ( $n = 102$ ; 95% CI: 84.3%–95.5%) agreeing or strongly agreeing that these are serious diseases. Only two participants (1.8%; 95% CI: 0.2%–6.4%) strongly disagreed (Table 5).

**Table 1. Awareness of Hepatitis B and C Among Participants (N = 112)**

Response	Frequency (n)	Percentage (%)	95% CI
Yes	92	82.1	74.3 – 88.1
No	20	17.9	11.9 – 25.7

**Table 2. Knowledge of Transmission Modes for Hepatitis B and C**

Transmission Route	Frequency (n)	Percentage (%)	95% CI
Blood transfusions	46	41.1	32.3 – 50.4
Needle sharing	23	20.5	13.7 – 29.3
Unprotected sexual contact	18	16.1	10.0 – 24.3
Unaware	7	6.3	2.6 – 12.5

**Table 3. Public Knowledge on Preventing Hepatitis B and C**

Response	Frequency (n)	Percentage (%)	95% CI
Yes	78	69.6	60.4 – 77.7
Not sure	26	23.2	15.7 – 32.1
No	8	7.1	3.1 – 13.5

**Table 4. Awareness of Vaccines Available for Hepatitis B and C**

Response	Frequency (n)	Percentage (%)	95% CI
Yes	74	66.1	56.9 – 74.4
No	38	33.9	25.6 – 43.1

**Table 5. Perception of Hepatitis B and C as Serious Diseases**

Response	Frequency (n)	Percentage (%)	95% CI
Strongly agree	50	44.6	35.6 – 53.9
Agree	52	46.4	37.2 – 55.7
Neutral	8	7.1	3.1 – 13.5
Strongly disagree	2	1.8	0.2 – 6.4

Support for mandatory screening was substantial, with 81.3% ( $n = 91$ ) in favor (data not shown in table for brevity). Willingness to encourage family members to get tested was reported by 74.1% ( $n = 83$ ). However, only 29.5% ( $n = 33$ ; 95% CI: 21.4%–38.8%) had ever undergone personal screening for hepatitis, while 66.1% ( $n = 74$ ; 95% CI: 56.9%–74.4%) had never been tested, and 4.5% ( $n = 5$ ; 95% CI: 1.5%–10.1%) had uncertain or incomplete responses (Table 6). Most respondents ( $n = 83$ , 74.1%; 95% CI: 65.1%–81.6%) expressed willingness to receive vaccination or treatment if

indicated, whereas 15.2% ( $n = 17$ ; 95% CI: 9.1%–23.1%) were unwilling, and 10.7% ( $n = 12$ ; 95% CI: 5.7%–17.9%) were unsure (Table 7). Consistent use of sterilized syringes and needles was reported by 76.8% ( $n = 86$ ; 95% CI: 68.1%–84.1%), while 23.2% ( $n = 26$ ; 95% CI: 15.7%–32.1%) did not always follow this practice. Additionally, 92% ( $n = 103$ ; 95% CI: 85.9%–96.2%) reported using personal hygiene items separately. Vaccination coverage was suboptimal, with only 22.3% ( $n = 25$ ; 95% CI: 15.1%–31.3%) reporting receipt of the Hepatitis B vaccine, 67.9% ( $n = 76$ ; 95%

CI: 58.8%–76.1%) not vaccinated, and 9.8% ( $n = 11$ ; 95% CI: 4.9%–16.9%) unsure (Table 8). If diagnosed with Hepatitis B or C, 76.8% ( $n = 86$ ; 95% CI: 68.1%–84.1%) would seek medical treatment,

15.2% ( $n = 17$ ; 95% CI: 9.1%–23.1%) were unsure, and 8.0% ( $n = 9$ ; 95% CI: 3.7%–14.7%) indicated they would not seek treatment (Table 9).

**Table 6. Testing History for Hepatitis B and C**

Response	Frequency (n)	Percentage (%)	95% CI
No	74	66.1	56.9 – 74.4
Yes	33	29.5	21.4 – 38.8
Uncertain	5	4.5	1.5 – 10.1

**Table 7. Willingness to Receive a Vaccine or Treatment for Hepatitis B and C**

Response	Frequency (n)	Percentage (%)	95% CI
Yes	83	74.1	65.1 – 81.6
No	17	15.2	9.1 – 23.1
Not sure	12	10.7	5.7 – 17.9

**Table 8. Hepatitis B Vaccination Status**

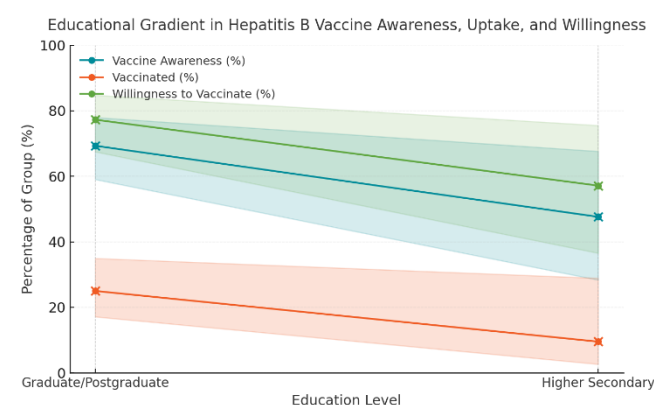
Status	Frequency (n)	Percentage (%)	95% CI
Yes	25	22.3	15.1 – 31.3
No	76	67.9	58.8 – 76.1
Unsure	11	9.8	4.9 – 16.9

**Table 9. Stated Treatment-Seeking Behaviour if Diagnosed with Hepatitis B or C**

Response	Frequency (n)	Percentage (%)	95% CI
Yes	86	76.8	68.1 – 84.1
No	9	8.0	3.7 – 14.7
Unsure	17	15.2	9.1 – 23.1

Minimal missing data were encountered; in the vaccination and testing history questions, five responses were incomplete and managed via exclusion for those analyses. No imputation was performed. All proportions are presented with exact 95% confidence intervals calculated using the binomial method. Comparisons across categorical subgroups (e.g., gender, educational attainment) were performed using Chi-square tests. No statistically significant differences were found across demographic subgroups for the primary outcomes (all  $p > 0.05$ ).

actual vaccination rate stood at 25.0% (95% CI: 16.4–35.6%). In contrast, higher secondary respondents ( $n = 21$ ) showed lower vaccine awareness at 50.0% (95% CI: 29.9–70.1%), willingness to vaccinate at 60.0% (95% CI: 38.7–78.9%), and an uptake rate of only 10.0% (95% CI: 1.8–33.1%). Visual trends demonstrate that while willingness and awareness increase with educational attainment, this gradient does not fully translate into higher vaccination coverage, with uptake lagging behind both attitudinal and knowledge domains across groups. Confidence interval bands highlight the precision of estimates, emphasizing the need for targeted strategies to close the observed gap between vaccine acceptance and real-world immunization.



**Figure 1 Educational Gradient in Hepatitis B Vaccine Awareness, Uptake, And Willingness**

Marked disparities were observed between education levels in Hepatitis B vaccine awareness, uptake, and willingness to vaccinate. Among graduate and postgraduate respondents ( $n = 88$ ), vaccine awareness reached 70.0% (95% CI: 59.4–79.0%), willingness to vaccinate was 78.0% (95% CI: 67.9–85.8%), and

## DISCUSSION

The present study provides important insights into the current state of knowledge, attitudes, and practices regarding Hepatitis B and C among residents of Dera Ghazi Khan, contributing to a more nuanced understanding of public health challenges in underserved regions of Pakistan. The finding that 82.1% of participants were aware of Hepatitis B and C, with 84.8% accurately linking these diseases to liver complications, aligns with previous research from urban centers of Punjab and other provinces, where moderate to high levels of awareness have also been documented (14,15). However, the persistence of a substantial awareness gap among 17.9% of the population highlights the ongoing risk of undiagnosed and untreated infection in rural settings, consistent with literature noting limited outreach and education in peripheral districts (13). In agreement with prior studies, the most commonly identified transmission routes were blood transfusions, shared needles,

and unprotected sexual contact, though a concerning proportion of participants—6.3%—remained unaware of transmission pathways, mirroring the knowledge deficits seen in other community-based surveys across South Asia (5,8,15).

Despite general awareness, the translation into preventive action was suboptimal. Only 66.1% of respondents recognized the availability of a hepatitis B vaccine and a mere 22.3% reported actual vaccination. These findings resonate with national data indicating that hepatitis B vaccine coverage in some Pakistani provinces remains below 40% (16,17). The discrepancy between vaccine awareness and uptake underscores both systemic barriers, such as limited access to primary care and vaccination services, and psychosocial factors including vaccine hesitancy, stigma, and low perceived personal risk. This disconnect has also been observed in other low- and middle-income countries, where public knowledge does not consistently translate into improved preventive behaviors or health-seeking actions (2,4,10). Encouragingly, the majority of participants expressed a willingness to undergo vaccination or seek treatment if indicated, reflecting a potentially favorable shift in community attitudes. The gap between intention and behavior, however, underscores a need for enhanced health education and structural interventions to facilitate uptake, as observed in the successful implementation of expanded immunization programs in better-resourced urban populations (3,16).

Comparative analysis with earlier studies further reveals that knowledge and attitudes are strongly influenced by education level. The current data demonstrate higher vaccine awareness and willingness to vaccinate among graduate and postgraduate respondents, yet even in this group, vaccination coverage lagged far behind, with only one in four reporting vaccine uptake. This finding is consistent with broader public health literature indicating that educational attainment is associated with increased health literacy and positive attitudes but does not invariably lead to behavioral change without concurrent improvements in healthcare delivery and community trust (7,12). The persistence of unsafe practices, including inconsistent use of sterile syringes, points to systemic vulnerabilities within the local health infrastructure, a pattern similarly reported in rural communities across the region (9,11). The high proportion of individuals willing to seek treatment, at 76.8%, is clinically significant, given the risk of progression from chronic infection to advanced liver disease; however, actual treatment-seeking may remain hindered by cost, stigma, and logistical barriers, as described by Baig *et al.* (10). Mechanistically, the findings reinforce theoretical models that link health behaviors to both individual knowledge and contextual barriers. The observed gaps can be interpreted through the lens of the Health Belief Model and socioecological frameworks, which posit that even high-risk populations may not adopt preventive measures if they lack cues to action, perceive low susceptibility, or encounter obstacles in healthcare access.

Stigma and misconceptions—such as associating hepatitis with immoral behavior—likely contribute to reluctance in screening and disclosure, a phenomenon well-documented in both local and international studies (9,10,11). The clinical implications are

substantial: sustained transmission within the community, continued underutilization of screening and vaccination, and avoidable morbidity from preventable liver disease. Addressing these gaps requires interventions that combine education, culturally tailored messaging, and systemic reforms to improve access and reduce barriers to care.

The strengths of this study include its adherence to rigorous methodological standards, the use of a validated, pilot-tested questionnaire, and a comprehensive sampling strategy encompassing diverse demographic groups. These factors enhance the internal validity and reliability of the findings. Nonetheless, several limitations must be acknowledged. The use of convenience sampling, while practical in resource-constrained settings, may introduce selection bias and limit generalizability to the broader population of Dera Ghazi Khan or similar rural regions. The cross-sectional design precludes causal inference, and self-reported data may be subject to recall or social desirability bias, particularly in the context of stigmatized health behaviors. The relatively small sample size, although adequate for descriptive statistics, may have reduced the power to detect statistically significant associations between subgroups or to explore interaction effects more robustly.

Future research should aim to expand on these findings by employing larger, probabilistic sampling methods and longitudinal designs that can elucidate causal relationships and monitor changes over time. Qualitative studies exploring the underlying beliefs and structural barriers that shape vaccination and treatment behaviors would further enrich understanding and support the design of more effective, context-sensitive interventions. There is also a need for intervention trials that evaluate the impact of community-based education, mobile vaccination campaigns, and policy reforms aimed at increasing accessibility and reducing stigma. Ultimately, this study underscores the urgent need for targeted, multi-level public health strategies to bridge the gap between knowledge and practice, increase vaccine uptake, and mitigate the enduring burden of hepatitis B and C in high-risk, under-resourced communities (12,17).

## CONCLUSION

This study demonstrates that while a moderate level of knowledge and positive attitudes regarding Hepatitis B and C exists among residents of Dera Ghazi Khan, critical gaps remain in vaccination coverage, screening uptake, and consistent preventive practices, particularly among those with lower educational attainment. The findings highlight the urgent need for targeted public health interventions to bridge the divide between awareness and actual preventive behavior, expand vaccine accessibility, and dispel persistent misconceptions within the community. Addressing these gaps is essential for reducing the burden of hepatitis B and C, improving early detection and treatment, and ultimately advancing liver health outcomes in high-risk, underserved populations.

Future research should focus on evaluating the effectiveness of culturally tailored educational programs and accessible immunization strategies to strengthen community engagement



and ensure sustainable improvements in hepatitis prevention and control.

## REFERENCES

1. Ramsay DB, Friedman M, Borum ML. Does the Race or Gender of Hepatitis C Infected Patients Influence Physicians' Assessment of Hepatitis A and Hepatitis B Serologic Status. *South Med J*. 2007;100(7):683-686
2. Singh H, Singh CS, Kaur P. Knowledge and Awareness Regarding Hepatitis B Infection Amongst Dental Students in Northern Parts of India: A Cross Section Study. *J Family Med Prim Care*. 2020;9(7):3618-3623
3. World Health Organization. Hepatitis B. Fact Sheet 204. Geneva: WHO; 2000. Available from: <https://www.who.int/news-room/fact-sheets/detail/hepatitis-b>
4. Muhammad Ali MA, Idrees M, Ali L, Hussain A, Ali M, Rahman SU, et al. Hepatitis B Virus in Pakistan: A Systematic Review of Prevalence, Risk Factors, Awareness Status and Genotypes. *Virol J*. 2011;8:102
5. Hussain I, Khan MS, Hussain S, Hussain S, Hussain M. Knowledge and Practices Regarding Hepatitis B Virus Infection and Its Prevalence Among Barbers of Rural Area of Rahim Yar Khan. *Infect Disord Drug Targets*. 2018;13:13
6. Saleem U, Ahmad B, Ahmad F, Younas S, Afzal MS, Fatima M. Hepatitis C Virus: Its Prevalence, Risk Factors and Genotype Distribution in Pakistan. *Eur J Inflamm*. 2022;20:1721727X221144391
7. Waheed Y, Shafi T, Safi SZ, Qadri I. Hepatitis C Virus in Pakistan: A Systematic Review of Prevalence, Genotypes and Risk Factors. *World J Gastroenterol*. 2009;15(45):5647-5653
8. Razi A, Asad M, Hassan A, Iqbal A. Knowledge Attitude and Practices of University Students Regarding Hepatitis B and C. *Educ Health (Abingdon)*. 2006;19(2):1487
9. Mehr MT, Janjua NZ, Akhtar S, Khuwaja AK. Frequency of Hepatitis B and C Infection in Newly Recruited Civil Servants in Khyber Pakhtunkhwa. *Khyber Med Univ J*. 2013;5(2):93-96
10. Baig S, Siddiqui AA, Ahmed W, Qureshi H, Arif A, Hamid S. Frequency of Hepatitis C and D Super Infection in Patients with Hepatitis B Related Complex Liver Disorders. *J Coll Physicians Surg Pak*. 2009;19(11):699-703
11. Ijaz A, Khan S, Khan S, Ashfaq M. Hepatitis B and Hepatitis C in Blood Donors: Analysis of 2-Years Data. *Ann King Edward Med Univ*. 2007;13(1):59-61
12. Lavanchy D. Hepatitis B Virus Epidemiology, Disease Burden, Treatment, and Current and Emerging Prevention and Control Measures. *J Viral Hepat*. 2004;11(2):97-107
13. Waheed Y, Siddiq M, Jamil Z. Hepatitis Vaccination: Improving Coverage Through Public Awareness. *J Transl Med*. 2015;13(1):147
14. World Health Organization. Hepatitis B Vaccines: WHO Position Paper – July 2021. Geneva: WHO; 2021. Available from: <https://www.who.int/publications/i/item/who-wer8827-269-292>
15. Butt G, Khan AA, Ahmed M. Knowledge, Attitudes, and Practices Regarding Hepatitis C in Southern Punjab, Pakistan. *Public Health*. 2019;173:57-63
16. Qureshi H, Bile KM, Jooma R, Alam SE. Prevalence of Hepatitis B and C Viral Infections in Pakistan: Findings of a National Survey. *Pak J Med Sci*. 2010;26(4):633-639
17. Riaz H, Malik MW, Shah SZA. Awareness of Hepatitis B and C Among University Students. *Pak J Public Health*. 2018;8(2):96-99