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Research Article

Bridging the Gap Between Knowledge and Practice: Insights into Hepatitis B Prevention and Vaccination Through a KAP Framework

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ABSTRACT

Hepatitis B Virus (HBV) is a hepatotropic virus that can cause chronic hepatocellular carcinoma. Hepatitis B virus remains a serious public health concern in Pakistan, with Multan being no exception to its growing burden. Despite the availability of an effective vaccine, gaps in public knowledge and inconsistent preventive practices continue to fuel transmission within local communities. This study aimed to assess the level of knowledge, attitude, and preventive practices (KAP) related to HBV among residents of Multan, with the goal of identifying gaps that could be addressed through targeted health education. An online, cross-sectional survey was conducted, reaching out to 500 individuals from the local community. Of these, 400 completed and valid responses were retained, giving a response rate of 80%. The questionnaire covered three core areas: participants' basic knowledge of HBV (including transmission routes, symptoms, and complications), their attitudes toward vaccination and screening, and their actual preventive practices in daily life, such as vaccination status, safe injection practices, and awareness of risk behaviors. The findings revealed that while a considerable portion of participants had heard of Hepatitis B, awareness of specific transmission modes and long-term complications, such as liver cirrhosis and hepatocellular carcinoma, was noticeably limited. Attitudes toward vaccination were generally favorable, yet actual vaccination uptake remained lower than expected, pointing to a gap between awareness and action. These results highlight that informational campaigns alone may not be sufficient; instead, community-based interventions that address practical barriers to vaccination and screening are urgently needed in Multan. Strengthening public health messaging, particularly around risk behaviors and long-term disease consequences, could help bridge the gap between what people know and what they actually do to protect themselves — an essential step toward the broader goal of HBV elimination.

Keywords:

Hepatitis B virus, knowledge, attitude, practice, vaccination, preventive behavior, liver health

1. INTRODUCTION

Hepatitis B virus (HBC) is a globally prevalent pathogen affecting 254 million people, causing persistent liver infection and progressive hepatic damage (Li *et al*., 2025; Sun and Guo, 2025). Hepatitis B virus is one of the main reasons of mortality associated with liver cancer (Ali *et al*., 2025). The liver plays a central role in HBV infection, since it is both

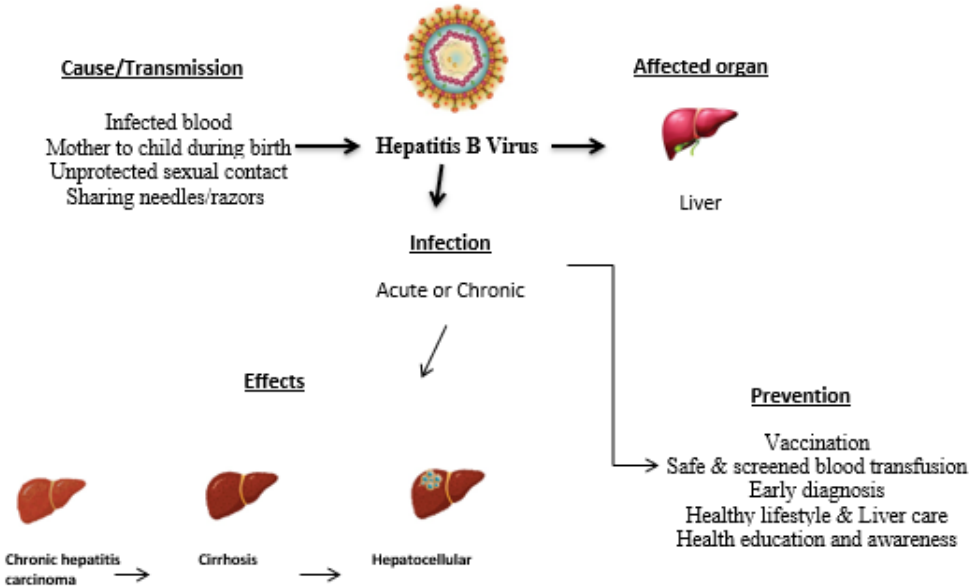


Figure 1. Disease Spectrum: From Acute Hepatitis to Cirrhosis and Hepatocellular Carcinoma

the site where the virus grows and multiplies and a key part of the body's immune system. HBV belongs to the family Hepadnaviridae and HBV genome consists of as a partially double-stranded DNA (Li *et al*., 2025). HBV has circular DNA genome enclosed within a nucleocapsid composed of hepatitis B core (HBc) protein, viral genomic DNA and viral polymerase (Pol). The genomic DNA of HBV is present in the form of relaxed circular DNA (rcDNA) (Ma *et al*., 2025). The virus is transmitted through contact with infected blood or bodily fluids, from a mother to child during pregnancy, or through sexual contact (Zhang *et al*., 2025). When Hepatitis B virus infects someone, it enters liver cells (hepatocytes) through receptor-mediated entry. Then it releases its DNA into the cell, which moves to the nucleus and is converted into a stable form which is used to produce new virus particles (Ma *et al*., 2025). In people affected by chronic HBV infection, the virus may result in chronic liver disease, including CHB, cirrhosis and HCC. Chronic HBV infection plays a leading role in the development of HCC. HBV virions are involved in the development of HCC both directly and indirectly (Ali *et al*., 2025). There is a complicated and multifactorial process, which causes the progression of CHB to cirrhosis. Persistent infection, hepatitis B virus replication and immune-mediated destruction of the liver and inflammation of the organ may lead to the gradual destruction of liver cells and replacement of normal liver cells by connective tissue. This process may ultimately lead to the development of cirrhosis (Sun and Guo, 2025). HCC is the third-leading cause of mortality in the world due to cancers and the sixth commonest cancer. The HBV genome has four overlapping open reading frames (ORFs), each of which plays a different role in viral replication. One of these, called the HBx protein, is especially important because it helps the virus grow, multiply, and has been linked to the development of liver cancer (Ma *et al*., 2025).

Hepatitis B virus is not only a health problem, but it is also associated with societal challenges (Zhang *et al*., 2025). To deal with this, there is

a need to understand how people think and feel about Hepatitis B virus. Therefore, knowledge, attitude, and practice (KAP) surveys help to understand what people know about the virus, how they feel about it, and what they do to prevent it (Deng *et al*., 2025). Many people have insufficient knowledge about HBV. This lack of knowledge can lead to behaviours that put them at risk of getting infected (Jayathilaka *et al*., 2025). Similarly, if someone is infected with Hepatitis B virus and does not get treated, it can lead to serious problems like liver cirrhosis and liver cancer (Ali *et al*., 2025). According to the Global Burden of Disease study, around 555,000 people died from Hepatitis B virus-related causes in 2019 (Ma *et al*., 2025). Vaccine against Hepatitis B virus remains the most effective tool in prevention (Vo *et al*., 2025). Other preventive measures may include increasing general awareness about the disease, its transmission, and prevention both among community as well as healthcare workers (Tagbor *et al*., 2025). However, access to screening and treatment remains uneven, particularly in rural or underserved areas (Wajcman *et al*., 2025).

The main goal of this study is to evaluate the status of knowledge, attitude, and practice regarding hepatitis B prevention and control, and to use these insights to develop targeted health education interventions that support the broader effort to eliminate HBV transmission.

2. METHODS

2.1 Study Design and Setting

A cross-sectional, survey-based study was conducted among the general population of District Multan, Pakistan, from August 2025 to February 2026. Data were collected through a structured questionnaire administered to eligible participants recruited via a convenience sampling technique, aiming to evaluate the prevalence and associated determinants of the variable under investigation (Figure 2).

2.2 Questionnaire and Scoring System

The measuring instrument used in the study is a well-structured English-language, online, self-administered questionnaire that was designed using Google Forms in order to obtain responses. The survey was further divided into six segments, first part included demographic variables and medical/family history of HBV. The second part was based on the knowledge of HBV transmission, relation with liver cancer, and its symptoms; having nine multiple-choice questions. The third part is focused on the myths and misconceptions related to HBV, and the fourth part assessed attitude toward HBV. The fifth part relates to the behaviors concerning health care and prevention. In the last sixth segment, we posed two open-ended questions about HBV and liver cancer. Different terms were given to respondents for each question. In order to validate the reliability of the data, the survey allowed each participant to respond only once, which was confirmed by email correspondence. The questions for the questionnaire were framed after referring to the literature available (Alaridah *et al*., 2026; Rahman *et al*., 2026; Zhang *et al*., 2025). The questionnaire took an average of six minutes to be completed by the respondents. Incomplete or invalid responses were excluded during data cleaning, and only complete responses were included in the analysis (Jayathilaka *et al*., 2025; Yasin *et al*., 2025).

2.3 Sample Size

On the basis of 5% response rate and 5% margin of error, the required sample size was calculated as 400 (Rahman *et al*., 2026). However, to achieve reliable and precise results, we obtained 500 responses for the survey; after cleaning the data, the 400 responses were complete and 100 responses were incomplete.

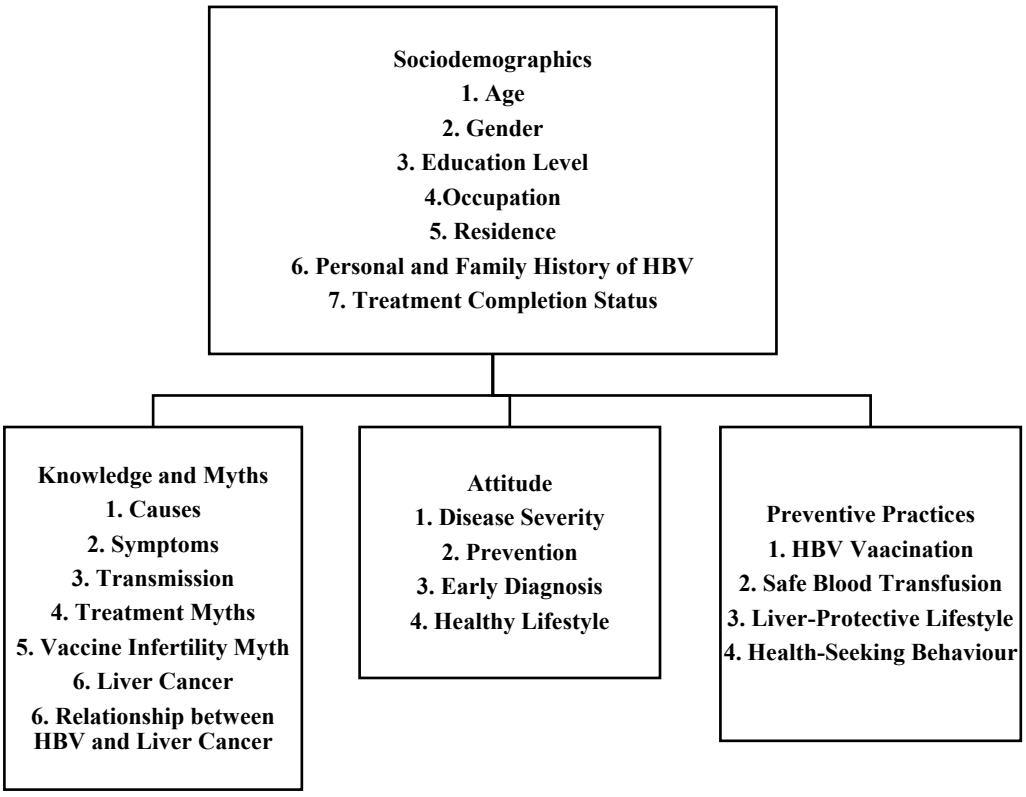


Figure 2. Framework of the Study

2.4 Recruitment Strategy for Target Population

We used a convenience sampling method to obtain the sample size of almost 500 participants. Regions other than Multan were not covered in the study. Participants under 15 years of age were excluded from the study. Participants who were able to understand the English language were included in the study (Rahman *et al*., 2026). The data was collected from a mix of private and public universities and from both employed as well as unemployed people (Ejaz *et al*., 2025). Involvement in this research was on a voluntary basis, and the participants were free to decline to participation.

2.5 Data Collection

An online questionnaire (Google Forms) was distributed via email or social networking websites (Yasin *et al*., 2025). Out of 500 participants, 400 participants completely filled the questionnaire, and were therefore were included in the study, while 100 were excluded.

2.6 Ethical Consideration

Ethical approval for the study was obtained from the ethics committee of The Women University Multan. The confidentiality and privacy of the participants were protected throughout the study following the Declaration of Helsinki and the ethical principles of research involving human subjects.

3. RESULTS

Demographics of the study participants showed that female participants constituted higher proportion (61.5%) than males (37.0%). Graduates formed the highest percentage (63.0%) of the study population, postgraduates were 23.5% while participants with intermediate (11.5%), secondary (1.5%), primary (0.5%) education constituted the lowest percentage. As majority of participants were well educated and resided in urban areas (67.0%), only 7.5% of the study participants had been diagnosed with Hepatitis B. Similarly, only a small portion (20.5%) had family history of Hepatitis B. Only 22.5% of patients diagnosed HBV had completed their treatment (Table 1).

Table 1. Socio-demographic Characteristics of Participants (n=400)

Variable	Category	Frequency (n)	Percentage (%)
Age	15-25	294	73.5%
	26-35	46	11.5%
	36-45	50	12.5%
	46-55	4	1%
	55+	6	1.5%
Gender	Male	148	37%
	Female	246	61.5%
	Prefer not to say	6	1.5%
Education Level	No Schooling	0	0
	Primary	2	0.5%
	Secondary	6	1.5%
	Intermediate	46	11.5%
	Graduate	252	63%
	Postgraduate	94	23.5%
Occupation	Student	280	70%
	Employed	88	22%
	Unemployed	22	5.5%
	Other	10	2.5%
Residence	Urban	268	67%
	Rural	132	33%
HBV Diagnosis	Yes	30	7.5%
	No	350	87.5%
	Not sure	20	5%
Family History of HBV	Yes	82	20.5%
	No	282	70.5%
	Not sure	36	9%
Treatment Completed	Yes	90	22.5%
	No	108	27%
	Not sure	58	14.5%
	Not applicable	144	36%

Table 2 provides information on participant's knowledge of Hepatitis B and its association with liver cancer. About 78% of the participants correctly understood that Hepatitis B is caused by a virus. Regarding the mode of transmission, 66.5% of the participants understood that Hepatitis B is transmissible. In terms of the modes of transmission, the most widely acknowledged modes were the sharing of needles or razors (66%), unsafe blood transfusion (61.5%), mother-to-infant transmission at childbirth (51%), and sexual intercourse without protection (48%). However, there were some participants who incorrectly thought that Hepatitis B was transmitted through food and cutlery (22%), coughing or sneezing (17%), and alcohol intake (12%). The majority of the participants (86.5%) correctly identified liver as the primary organ affected by Hepatitis B virus. Moreover, 76.5% knew that there was a vaccine available for HBV.

Table 2. Participants` knowledge regarding Hepatitis B and its association with liver Cancer (n=400)

Variable	Category	Frequency (n)	Percentage (%)
Cause of Hepatitis	Virus	312	78%
	Bacteria	48	12%
	Parasite	12	3%
	Not sure	28	7%
HBV spreads person to person	Yes	266	66.5%
	No	86	21.5%
	Not sure	48	12%
HBV Transmission route (select all that apply)	Sharing needles/razors	264	66%
	Unsafe blood transfusion	246	61.5%
	Unprotected sex	192	48%
	Mother to child at birth	204	51%
	Through food/ utensils	88	22%
	Coughing/sneezing	68	17%
	Through alcohol consumption	48	12%
	Not sure	56	14%
Main organ affected (select all that apply)	Heart	10	2.5%
	Liver	346	86.5%
	Kidneys	36	9%
	Lungs	30	7.5%
	Not sure	40	10%
HBV vaccine available	Yes	306	76.5%
	No	36	9%
	Not sure	58	14.5%
HBV always leads to Liver cancer	Yes, always	124	31%
	No, not always	200	50%
	Not sure	76	19%
	Long term liver infection	258	64.5%

Variable	Category	Frequency (n)	Percentage (%)
HBV associated Liver cancer due to (select all that apply)	Weakening the liver	164	41%
	Liver scarring	122	30.5%
	Do not know	68	17%
Source of Information (select all that apply)	Doctor/Health worker	188	47%
	Family/Friends	116	29.1%
	Television/Radio	86	21.6%
	Social media	174	43.7%
	Newspaper/Magazines	68	17.1%
	School/College/University	170	42.7%
	Health awareness campaigns	126	31.7%
	Other	48	12%
Symptoms of Liver cancer (select all that apply)	Unexplained weight loss	228	57%
	Abdominal pain or swelling	200	50%
	Yellowing of skin or eyes	260	65%
	Nausea or vomiting	160	40%
	Itchy skin	82	20.5%
	Dark colored urine	180	45%
	Anemia	134	33.5%
	No symptoms at early stages	70	17.5%

Table 3. Myths and Misconceptions regarding Hepatitis B (n=400)

Variable	Category	Frequency (n)	Percentage (%)
Who can get HBV?	Only adults	30	7.5%
	Only older people	18	4.5%
	People of any age	322	80.5%
	I do not know	30	7.5%
Treatment method for HBV (select all that apply)	Allopathic medical treatment	260	65%
	Ayurvedic/Hakeem/Traditional treatment	52	13%
	Spiritual Healing	40	10%
	Homeopathic treatment	124	31%
	It cannot be controlled, only cured	110	27.5%
HBV vaccine causes infertility?	Yes	58	14.5%
	No	146	36.5%
	May be, I am not sure	156	39%
	I have heard this from others but do not know the truth	40	10%

Regarding the connection between HBV and liver cancer, 50% correctly replied that Hepatitis B does not always lead to liver cancer, while 31% thought that it does, and 19% were not sure. In addition, 64.5% of the people knew that chronic infection of the liver leads to HBV liver cancer, then weakening of the liver (41%), and then liver scarring (30.5%), while 17% did not know how the association. As regards the source of information, doctors and health workers were mentioned by 47% as the most popular information source. A small percentage of participants believed that liver cancer may have no symptoms during its early stages. The myths and misconceptions about Hepatitis B among the participants are shown in Table 3.

In Table 3 most participants (80.5%) knew that anyone, irrespective of their age, could have Hepatitis B. 7.5% of participants felt that only adults could be infected with Hepatitis B. 4.5% believed that only old people were vulnerable to the disease. For treatment of HBV, 65% of the respondents identified allopathic medical treatment as an effective treatment for the same. Furthermore, 27.5% felt that Hepatitis B was uncontrollable and could only be cured. Regarding the myth related to the causation of infertility by the vaccine of HBV, 36.5% of the participants answered "No". 14.5% of the respondents answered affirmatively to the statement, "HBV vaccine causes infertility?".

Table 4. illustrates the attitudes of the participants regarding hepatitis B and liver cancer. Generally, the participants exhibited a favorable attitude concerning the prevention of HBV and liver health. The majority of the respondents agreed and strongly agreed that hepatitis B is not selective on anyone (77.5%), HBV can lead to death (70%), liver cancer is preventable by regulating HBV (73.5%), physical exercise and a healthy lifestyle promote liver health (84.5%) and finally, liver cancer is preventable via early diagnosis of HBV (81.5%). The participants differed in their opinion whether a person with hepatitis B can appear healthy, where 37.5% agreed, 32% were undecided while 30.5% disagreed.

Table 4. Attitude towards HBV, Liver health and Liver cancer (n=400)

Variable	Category	Frequency (n)	Percentage (%)
Anyone can get Hepatitis B	Strongly agree	132	33%
	Agree	178	44.5%
	Neutral	70	17.5%
	Disagree	18	4.5%
	Strongly disagree	2	0.5%
Hepatitis B can be fatal	Strongly agree	88	22%
	Agree	192	48%
	Neutral	90	22.5%
	Disagree	28	7%
	Strongly disagree	2	0.5%
Liver cancer can be prevented by controlling Hepatitis B	Strongly agree	88	22%
	Agree	206	51.5%
	Neutral	84	21%
	Disagree	18	4.5%
	Strongly disagree	4	1%

Variable	Category	Frequency (n)	Percentage (%)
Physical activity and healthy lifestyle improve liver health	Strongly agree	188	47%
	Agree	150	37.5%
	Neutral	52	13%
	Disagree	8	2%
	Strongly disagree	2	0.5%
	Agree	200	50%
	Neutral	58	14.5%
	Disagree	14	3.5%
	Strongly disagree	2	0.5%
A person with Hepatitis B can look healthy	Strongly agree	32	8%
	Agree	118	29.5%
	Neutral	128	32%
	Disagree	82	20.5%
	Strongly disagree	40	10%

Table 5 indicates the preventive measures used by the participants to protect themselves from contracting Hepatitis B. The respondents who have been vaccinated against the HBV infection are only 22%, whereas 49.5% are unvaccinated. In the unvaccinated respondents, the major reasons for not having the vaccines include feeling that the vaccine is not required (45.5%), lack of awareness (33.5%), and fear of side effects (23%). More than half of the participants (53.5%) claim that they make sure their blood is checked before transfusion. As far as the protective practices for the liver are concerned, the most prevalent practices include having a healthy diet (72.5%), drinking filtered water (59.5%), abstaining from alcohol (54.5%), exercising regularly (50.5%), avoiding medicines unnecessarily (47.5%), not sharing personal belongings (44%), and using new and sterilized injections (43%).

Table 5. Preventive Practices regarding vaccination, blood transfusion and Liver health (n=400)

HBV vaccination status	Yes(all doses completed)	88	22%
	Yes(not sure about number of doses)	42	10.5%
	No	198	49.5%
	Not sure	72	18%
If you are unvaccinated, what is the main reason? (select all that apply)	I do not think I need it	182	45.5%
	Lack of awareness	134	33.5%
	Fear of side effects	92	23%
	Vaccine is very expensive	40	10%
	I plan to get it soon	78	19.5%
	Other	30	7.5%

If you ever need a blood transfusion, what do you ensure?	Blood is screened	214	53.5%
	Blood is taken from known blood bank	90	22.5%
	I do not check anything	44	11%
	I do not know about screening	52	13%
Lifestyle practices for liver protection (select all that apply)	Healthy diet	290	72.5%
	Avoiding alcohol	218	54.5%
	Regular exercise	202	50.5%
	Drinking clean water	238	59.5%
	Avoiding unnecessary medicines	190	47.5%
	Not sharing personal items	176	44%
	Checking that injection is new/sterilized	172	43%
	None of these	24	6%

4. DISCUSSION

This study set out to evaluate community-level knowledge and preventive practices regarding Hepatitis B, using an online survey approach; of the 500 individuals contacted, 400 provided complete responses, yielding a response rate of 80%. In comparison with the previous study, the present study had a higher proportion of graduates and a lower proportion of intermediate-level education; 11.5 % for present study and 25.4% for previous research. Unemployment rate for our study (5.5%) was lower than the previous study (46.7%) (Including housewives and students) and in our research the proportion for the urban residency was 67% and in comparison, with previous study 54.9% participants having urban residency. The lower unemployment rate may be associated with the higher proportion of urban residency, where employment opportunities are generally more accessible (ul Haq *et al*., 2012). This study demonstrated that 7.5% of the participants were patients, and 20.5% reported a family history of hepatitis B, while in cited study the percentage was 69.63% for both patient and family members. Lower rates of HBV diagnosis in present study may be due to differences in healthcare accessibility, public awareness or prevalence in the study area (Deng *et al*., 2025). In the present study, among local population 78% participants accurately identified hepatitis B as a viral disease, which was higher than the earlier study reported 41% among nursing students. This difference reflects that participants in the present study had better knowledge related to the etiology of hepatitis B and higher level of awareness. This difference may be due to increased use of social media awareness or variations in the time of data collection (Balegha *et al*., 2021). Proportion of participants who identified hepatitis B transmission through unprotected sex was 48% in the current study and 40.7% in an earlier study, indicating similar level of awareness among local population and HBV patients (Li *et al*., 2026). However, healthcare

professionals and students had greater knowledge than local population. Although they had reported poor understanding in addressing misconceptions about hepatitis B; 58.9% wrongly believed that HBV could be transmitted through sharing utensils and food with an HBV-infected person (Alaridah *et al*., 2023).

In this study, 86.5% of respondents of this study were aware that hepatitis primarily affects liver but mostly did not know that hepatitis could affect other organs as well. Only 9% and 2.5% of respondents knew that hepatitis affects kidneys and heart respectively. As comparison with the cited study, the majority of students 98.33% were aware that hepatitis primarily affects liver, but 15.33% knew that hepatitis affects kidney, and only 5.67% were aware that hepatitis is likely to affect heart as well. There is a great similarity in both the studies despite of a huge difference in the study periods, which reflects that still there is need for educational interventions (Khurram, 2008). Participants identified the following treatment options for HBV: allopathic (65%), homeopathic (31%), traditional (13%) and spiritual treatments (10%). In addition, 27.5% of participants believed that HBV cannot be managed and that only a cure is possible. Mixed belief related to treatment or cure in the current study may delay appropriate medical evaluation. Therefore, there is a need for greater public awareness. The lethal outcome of infection in present study demonstrated that 48% agreed that hepatitis B could be fatal, while earlier study showed that in opinion of 31.67% HBV could be lethal (Khurram, 2008). Many participants in our study were generally well-informed about the progression of liver cancer due to long term hepatitis B infection and its prevention by early diagnosis. Similarly, in a previous study, many participants were knowledgeable about the components of routine liver examinations, and the subtle early symptoms and progression of cirrhosis (Zhang *et al*., 2026). Most of the participants (83%) in our study knew that hepatitis B could cause liver cancer, as reported in an earlier study that 96% of participants were aware about cirrhosis as main complication of hepatitis (Khurram, 2008). However, another study reported only 11.23% of the participants to be aware of chronic hepatitis B as one of the primary liver cancers agents (Deng *et al*., 2025). The major source of information in current study were doctors/health workers (47%), social media (43.7%), and schools/colleges (42.7%), as compared to other studies where the major sources were family, friends, and neighbours (36.4%), followed by 17.7% informative leaflets, brochures and posters (ul Haq *et al*., 2012). In another previous study, the media (71.33 %) turned out to be an important source of information about hepatitis, with other sources being clinical wards and doctors (57.67 %), books (46.33%), and general public (33.33%) (Khurram, 2008). There was an interesting finding that before blood transfusion, 11% participants did not tested anything, 13% did not know about screening, 53.5% confirmed if blood was screened, and 22.5% confirmed if blood was taken from a known blood bank. This lack of seriousness and lack of knowledge often leads to severity of the disease. As in an earlier study it was reported that only 44.1% agreed with the statement that they asked for screening of blood before transfusion (ul Haq *et al*., 2012).

On inquiring about the HBV vaccination status of respondents, it was found that only 22% were fully vaccinated, 10.5 % were incompletely vaccinated, 49.5% were unvaccinated, and the remaining 18% were not sure whether they were vaccinated or not. A previous study reported 22.7% of the respondents received all three doses of the HBV vaccine, 8.6% were incompletely vaccinated, 18.5% were unvaccinated, and the remaining 50.3% were not sure whether they

were vaccinated or not. There is a substantial similarity in vaccinated status between both studies showing almost same behavioral status (Kumar *et al*., 2023). Positive attitude was observed toward preventive practices from the majority of participants including healthy diet, regular exercise, and they strongly agreed that physical activity and healthy lifestyle improve liver health. A similar attitude was seen in a previous study, where 93.07% of the participants recognized the pivotal role of diet and lifestyle in preventing cirrhosis (Zhang *et al*., 2026). Although the participants expressed concern about the sterility of syringes, only 43% participants claimed that they confirmed the sterility of syringes. A similar observation was reported in a previous study where 81.8% of the participants never asked for a new syringe. The virus can be efficiently transmitted efficiently through contaminated syringes (ul Haq *et al*., 2012). Enhanced knowledge of HBV has been shown to positively influence vaccination-related behavior. Preventive strategies operate across three interconnected levels: primary, secondary, and tertiary, each reinforcing the others. Furthermore, sociodemographic characteristics may serve as important determinants of screening uptake and treatment rates across populations.

Conclusion

The current study highlighted notable gaps between knowledge, attitudes, and preventive practices regarding hepatitis B among residents of Multan, Pakistan. Misconceptions about vaccination, treatment, and transmission observed in the participants, along with inconsistent adoption of safe injection and blood transfusion practices, underscores the necessary public health interventions. Awareness programs including educational campaigns and improved screening and vaccination availability are recommended. Such measures could help reduced HBV transmission and contribute to hepatitis B elimination efforts in Pakistan.

Declarations

Conflict of Interest Statement

The authors declare no conflict of interest.

Author Contributions

LN: Investigation, Formal analysis, Methodology, Writing – original draft. **HY:** Writing – review & editing, Supervision.

Ethics Approval

Ethical approval for this study was obtained from the Ethics Committee of The Women University Multan, Pakistan. Participation was voluntary, and the confidentiality and privacy of all respondents were maintained throughout the study in accordance with the ethical principles of the Declaration of Helsinki.

Generative AI Disclosure

The authors confirm that no generative artificial intelligence tools were used in this manuscript.

Availability of Data

The data is available upon reasonable request.

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