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REVIEW ARTICLE



# Knowledge, attitudes, and practices of the population regarding viral Hepatitis B and C worldwide: a systematic literature review

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## ABSTRACT

**Introduction.** The term “hepatitis” implies liver damage by inflammatory cells, a condition with numerous origins. Viruses, predominantly hepatitis B and C viruses cause most cases of hepatitis, which can lead to chronic liver diseases. Assessing the general knowledge and awareness of the population regarding viral hepatitis is crucial for developing targeted and effective strategies to address these epidemics. This knowledge can help tailor interventions for different population strata, such as youth and adults, thereby enhancing the impact of prevention and care efforts.

**Materials and methods.** An exhaustive search of relevant literature was performed in electronic databases such as PubMed, Scopus, and Web of Science. Key terms included “viral hepatitis B,” “viral hepatitis C,” “knowledge,” “attitudes,” “practices,” and “population.” Articles included in the analysis were selected based on predefined inclusion and exclusion criteria.

**Results.** In a Nigerian hospital, 33% of healthcare workers lacked knowledge of hepatitis B, and 35% were not immunized. In an Iraqi study, 75% believed HBV is more easily transmitted than HIV, and 33.9% knew HBV could spread through toothbrushes. In India, most medical students were aware of hepatitis B (84.8%). Their knowledge about transmission through blood transfusion (81.06%) and needles (74.1%) was good, but they had poor knowledge about other modes of transmission and clinical features. A study in Tehsil Wazirabad, Gujranwala found good knowledge about hepatitis C transmission and symptoms. In Saudi Arabia, dental students revealed insufficient knowledge about hepatitis B infection. Practice levels varied, with 47.2% showing high practice and 22% low practice. Female participants exhibited higher knowledge, attitudes, and practices. In Gauteng province, South Africa, a 2015 study found that healthcare workers had inadequate knowledge of viral hepatitis. The average knowledge score was 2.0 out of 6, while practice and attitude scores were higher.

**Conclusions.** A significant difference in knowledge levels regarding viral hepatitis B and C was highlighted within the population. The overall level of knowledge regarding viral hepatitis B and C remains inadequate among both medical personnel and the general population. There is a growing need for education and awareness about viral hepatitis B and C.

**Keywords:** viral hepatitis B, viral hepatitis C, knowledge, attitudes, practices.

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## Key messages

### What is not yet known on the issue addressed in the submitted manuscript

Current literature lacks comprehensive insights into the global variations of knowledge, attitudes, and practices among populations concerning viral Hepatitis B and C. Particularly, there is a dearth of understanding regarding the socio-cultural factors influencing awareness and behaviors related to these infections.

### The research hypothesis

The study posits that a systematic review of existing literature will reveal significant disparities in knowledge levels, attitudes, and practices related to Hepatitis B and C across different regions and demographic groups worldwide. Furthermore, it hypothesizes that socio-economic factors will significantly influence the development of these differences.

### The novelty added by the manuscript to the already published scientific literature

This systematic literature review contributes novel insights by synthesizing existing research on the global landscape of knowledge, attitudes, and practices regarding Hepatitis B and C. By identifying gaps in understanding and highlighting socio-cultural influences, the study enhances our comprehension of how these factors affect public health interventions and policies worldwide.

## Introduction

The term “hepatitis” implies liver damage by inflammatory cells, a condition with numerous origins. Most cases of hepatitis are caused by viruses, predominantly hepatitis B and C viruses (HBV and HCV), which can lead to chronic liver diseases. HBV has been recognized since 1965, and the first vaccines were approved in the early 1980s. HCV, previously known as non-A, non-B hepatitis, was identified only in 1989, with no vaccine available to date. These viruses are endemic in many countries worldwide; however, prevalence rates fluctuate significantly [1]. Viral hepatitis B and C pose challenges for public health systems, given the development of chronic infections, complications, and deaths. Together, hepatitis B and C account for nearly 95% of deaths caused by viral hepatitis worldwide, surpassing human immunodeficiency virus (HIV) and tuberculosis. In 2016, the World Health Organization (WHO) recognized viral hepatitis as a pandemic, focusing on reducing transmission, increasing vaccination rates, and expanding access to treatment [2]. Hepatitis B is a significant public health problem affecting nearly 10% of the global population. According to the WHO report in 2009, approximately 2 billion people are affected by HBV worldwide, with over 270 million suffering from chronic infection throughout their lives, and over one million individuals dying from cirrhosis and liver cancer each year [3-5]. Hepatitis B virus (HBV) infection is considered one of the occupational risks threatening healthcare workers. Additionally, assessing the knowledge, attitudes, and practices among these individuals can be considered one of the most crucial activities for developing strategies to prevent HBV infection [6]. The Centers for Disease Control and Prevention (CDC) reported that 3.9 million people (1.8%) are infected with HCV, and 2.7 million of these infections will become chronic [7]. The main modes of transmission of hepatitis B and C viruses are through exposure to biological fluids such as blood, semen, or vaginal secretions, sexual contact, sharing contaminated needles, razors, or toothbrushes [8-10]. Recent epidemiological studies in Hong Kong have shown that diagnosis and treatment rates within the community have significantly lacked, hovering around 50%, compared to WHO's 90% - 80% [11, 12]. Inadequate knowledge and awareness of viral hepatitis B and C in the community have been shown to contribute to these deficiencies [11-14]. Elsewhere in the world, social stigmatization resulting from poor knowledge has been reported

to reduce diagnosis and treatment rates among high-risk individuals [15-17]. Knowledge about viral hepatitis B and C among healthcare workers, especially in primary healthcare and social care, has generally been poor. Although there have been no large-scale controlled studies on healthcare workers' knowledge of chronic hepatitis B and hepatitis C, knowledge has been imperfect in all surveys whose results have been published [18]. The study of knowledge, attitudes, and practices measures the key knowledge, feelings, trends, or abilities shared by a community regarding certain aspects. It has been used as a useful study tool for designing public health policies by considering the awareness, beliefs, and health-seeking behavior of at-risk populations. In Ethiopia, data on knowledge, as well as attitudes and practices regarding occupational exposure to HBV among health sciences students, are scarce, although the prevalence of infection is high in the general population [19-21]. An adequate assessment of knowledge, attitude, and practice factors, along with an understanding of the disease, are helpful in prevention and require adopting a healthy lifestyle throughout life [22-24]. Knowing the facts, having a proper attitude, and being aware can largely prevent the risk of viral hepatitis [25, 26]. For any preventive government measures or programs, community success, awareness, and participation are vital. Hence, information related to community knowledge and awareness is crucial for community prevention programs [27]. Prevention is the key to combating hepatitis B and C, which includes standard universal precautions, prophylactic vaccination, and standard treatment [28-31]. The epidemiological situation regarding viral hepatitis is determined both by the inadequacy of knowledge and by the limited access or lack of screening services [32]. Surveys on knowledge, attitudes, and practices are representative of a particular population, aiming to gather information on what is known, believed, and done regarding a specific subject, and they are the most used study tool in health behavior research [33, 34]. Knowledge is typically assessed to determine the extent to which community knowledge aligns with biomedical concepts [33, 35]. Prevention against any disease is proportional to the Knowledge, Attitude, and Practice of the population and reflects the importance given to health issues in society. Therefore, these studies play an imperative role in determining a society's ambiguities and are widely used in research evaluating population-reported assessments globally. Despite efforts by authorities to

increase knowledge and awareness of hepatitis B and C, no progress is reported [33]. Assessing the general knowledge and awareness of the population regarding viral hepatitis is crucial in developing targeted and effective strategies to address these epidemics. This knowledge can help tailor interventions for different population strata, such as youth and adults, and can enhance the impact of prevention and care efforts [36]. There are few studies on knowledge and practices related to viral hepatitis B and C among the general population in developing countries, yet such studies are crucial for the proper utilization of limited resources under poor socioeconomic and educational conditions [37]. Population health education plays a crucial role in early disease identification and initiating timely appropriate treatment [38].

## Material and methods

### 1. Article selection and resource identification

To conduct this systematic review, an exhaustive search of relevant literature was performed in electronic databases such as PubMed, Scopus, and Web of Science. Key terms included “viral hepatitis B,” “viral hepatitis C,” “knowledge,” “attitudes,” “practices,” and “population.” Articles included in the analysis were selected based on predefined inclusion and exclusion criteria.

### 2. Inclusion and exclusion criteria

Eligible articles had to meet predefined criteria, including publication period, thematic relevance, as well as robust methodology. Articles with incomplete data or research methods deemed inappropriate for our objective were excluded.

### 3. Selection and data extraction process

Titles and abstracts of identified articles were evaluated. Articles deemed relevant underwent a thorough evaluation of the full text. Relevant data regarding the population's knowledge, attitudes, and practices towards viral hepatitis B and C were systematically extracted and documented.

### 4. Assessment of article quality

The methodological quality of each article was assessed using specific tools appropriate for each type of study included in the review. This process included evaluating the validity of the obtained results.

### 5. Data synthesis and analysis

The extracted data were synthesized and presented in a comprehensive manner, highlighting trends and general conclusions from the existing literature.

## Results

After analyzing the available literature, a significant difference in knowledge levels regarding viral hepatitis B and C was highlighted within the population. The studies included in this analysis revealed that certain regions suffer from notable gaps in understanding the modes of transmission, symptoms, and prevention of these diseases.

Most study participants indicated that traditional sources, such as healthcare workers and awareness campaigns, serve as primary sources of information regarding viral

hepatitis. However, it became evident that there is still an urgent need to improve access to information and education, especially among specific demographic groups.

According to a study conducted in China among pregnant women, 96.1% of HBsAg positive respondents knew that hepatitis B is infectious, but only 49.7% correctly identified the routes of transmission. Furthermore, 84.3% knew that hepatitis B could be prevented by vaccination, though only 58.2% mentioned that vaccination requires 3 doses. Additionally, 88.9% recognized that their children are susceptible to infection. However, 45.8% of pregnant women carrying HBV considered that cesarean section is effective in preventing mother-to-child transmission, and 23.5% mentioned that bottle-feeding is effective in preventing mother-to-child transmission. Knowledge regarding HBV and its mother-to-child transmission among pregnant women or women of childbearing age was relatively insufficient, which may contribute to the risk of HBV transmission [39].

A study conducted in the USA among persons infected with HCV and HIV/AIDS showed a low knowledge score (<50% of the total possible score) regarding HCV [40].

A study conducted in a hospital in Nigeria found that 33% of healthcare workers had poor knowledge about hepatitis B virus infection, and 35% were not immunized against HBV. Challenges identified for hepatitis control included lack of hospital policy (91.6%), weak orientation of newly hired health workers (75.9%), and low risk perception (74.6%) [41].

In a study conducted in Iraq, 75% of participants mentioned that HBV is more easily transmitted than HIV. Women had a significantly higher percentage (35.2%) believing that HIV is more easily transmitted than HBV compared to men (20.2%). Villagers also had a higher percentage (29.5%) believing that HIV is more easily transmitted than HBV compared to urban residents (22.4%). Only 33.9% of subjects knew that HBV could be transmitted through toothbrushes. Most participants without education (75.9%) believed that HBV could be transmitted through food. A moderate level of knowledge about HBV among participants was noted, suggesting the need for more studies to assess the knowledge level after the implementation of educational programs [42].

Most medical students in India (84.8%) were aware of hepatitis B infection, and 77.3% stated that it is an infectious disease. Additionally, 71.2% of students knew that hepatitis B is caused by a virus, 81.06% of students knew that it can be transmitted through blood transfusion, and 74.1% knew that it can be transmitted through contaminated needles and syringes. However, knowledge about other modes of transmission, such as sexual contact (28.8%), mother-to-child transmission (23.5%), and piercing and tattooing (31.1%) was poor. Students had poor knowledge about the clinical features of acute hepatitis B infection, with only 72.7% knowing that it can cause jaundice. Knowledge about other clinical manifestations such as fever (42.4%), loss of appetite (25.8%), and nausea and vomiting (28.0%) was also poor. There is a lack of precise knowledge and aware-

ness about hepatitis B among medical students. Reforms in the educational curriculum are necessary to promote knowledge and awareness among medical students, including knowledge about transmission, complications, and the need for health education regarding hepatitis B [43].

The study included 260 healthcare workers from two medical units in Tehsil Wazirabad, Gujranwala district. Participants had sufficient knowledge about the transmission of hepatitis C, its symptoms, and its effects on the liver. However, there were misconceptions about the transmission of hepatitis C from mother to child during childbirth, with 23% stating it is not possible. Most respondents (53.1%) stated that hepatitis C may not survive at room temperature. Respondents demonstrated sufficient knowledge about the symptoms of hepatitis C, its transmission, and its long-term effects on the liver. However, they were unaware of the transmission of hepatitis C from mother to child during childbirth and had no knowledge of updated treatment plans. The study highlights the need for improved education and awareness among healthcare providers regarding the transmission and treatment of hepatitis C [44].

A study conducted on 356 medical workers in Tehran, Iran concluded that 44.9% of participants were aware that viral hepatitis B and C can be transmitted between patients, dentists, and vice versa. Knowledge about transmission routes, prevalence, protection, and post-exposure seroconversion rates of HBV and HCV was unsatisfactory among participants. Complete vaccination against HBV was done by 88.1% of participants, and 83.8% had positive surface antibodies against hepatitis B (anti-HBs). Only 24% of surgeons often used double gloves, and 28% reported needle stick injuries. There was no significant correlation between different specialties and concern about HBV and HCV, inadequate reporting of accidental needle sticks, and correct knowledge of post-exposure management. Participants' knowledge about HBV and HCV was unsatisfactory, indicating the need for further education. Medical workers need to be well informed to improve the knowledge, attitudes, and behaviors of other healthcare workers and patients regarding HBV and HCV [45].

A study conducted at a tertiary care center in Lucknow, India, evaluated the knowledge and awareness of hepatitis B and C infection among auxiliary staff. In 2015, the awareness of transmission routes and vaccination for hepatitis B and C infection was unsatisfactory. There was a direct positive correlation between education level and awareness, indicating that participants with higher knowledge had better attitudes towards infection prevention. Most participants in both 2015 and 2017 were not fully vaccinated against hepatitis B and were unaware of the availability of post-exposure prophylaxis. The study concluded that in 2015, there was poorer knowledge and awareness among workers compared to 2017 regarding the dangers of hepatitis B, its mode of transmission, and prevention methods. The findings underscore the need to improve the level and quality of health education, enhance the accessibility and availability of vaccines, and implement effective health programs to prevent

the spread of hepatitis B and C viruses [46].

A study conducted in Saudi Arabia among 890 individuals aged 20 to 50 years found that 69.3% were women, 48.3% were employed, and 77% had a university degree. Only 8% of subjects reported having contracted hepatitis B. Most participants showed a solid understanding of transmission methods, definition, symptoms, and consequences of the disease. However, due to a lack of testing or vaccination for hepatitis B infection, the practice level was diminished in 66% of subjects. Regarding hepatitis B, a notable 56% of subjects demonstrated satisfactory levels of knowledge, attitude, and practice, with commendable scores in knowledge and attitude but lower practice levels among most participants [47].

Another study conducted among medical students in Tamil Nadu, India, assessed the distribution of participants by academic year, noting that 25.4% were in the first year, 22.4% in the second year, 24.9% in the third year, and 27.3% in the fourth year of study. The findings revealed that medical students exhibited commendable performances regarding their knowledge, attitudes, and practices related to viral hepatitis prevention. Specifically, correct responses provided by participants reached 77.07% for knowledge, 77.56% for attitude, and 76.59% for practices related to viral hepatitis prevention. Regarding the vaccination status of medical students, a substantial majority of 79.5% received complete immunization against hepatitis B, while the remaining 20.5% received only partial vaccination. Based on the obtained results, it can be concluded that increasing awareness among medical students regarding hepatitis B infection and ensuring their active immunization are imperative measures to be taken to effectively control virus transmission. Additionally, it is recommended that medical students and paramedics undergo periodic retraining sessions to stay updated with current knowledge regarding universal precautions, post-exposure prophylaxis, and hospital waste management [48].

A study conducted in Australia among 194 homosexual and bisexual men reported a substantial level of understanding regarding viral hepatitis C. However, only 76% were knowledgeable about the accessibility of new treatments for HCV. A significant proportion of men, one in six, expressed uncertainty about their personal history of hepatitis C testing. This lack of certainty implies a deficiency in awareness or knowledge about their health status [49].

The study conducted in Italy in 2021-2022 aimed to analyze the level of understanding regarding hepatitis C virus infection and awareness of HCV screening tests in Italy before the initiation of awareness campaigns in 2022. The median knowledge score was 75%, while the median score for prevention and transmission knowledge was 46.2%. A total of 23.2% of participants had no knowledge of the existence of HCV screening tests. Factors such as higher education, pursuing a health-related field of study or profession, history of accidental injury, HCV infection, and active seeking of HCV information were positively associated with the Disease Knowledge Score. LGBT men had a significant-

ly lower Disease Knowledge Score. Participants affected by hepatitis C had a negative association with the Prevention and Transmission Knowledge Score. The study highlighted a concerning lack of knowledge regarding prevention and transmission, underscoring the need for targeted educational campaigns. Future research should focus on assessing the effectiveness of awareness campaigns [50].

A study conducted among dental students in Saudi Arabia in 2019 found that the level of knowledge regarding hepatitis B infection was insufficient, with only 7.6% of participants possessing a commendable level of knowledge. However, participants exhibited a positive attitude towards patients infected with hepatitis B. Nonetheless, 48.8% of participants exhibited an attitude below the average level. Regarding practice, 47.2% of participants demonstrated a high level of practice, while 22% exhibited a low level of practice. When comparing male and female participants, it was observed that female participants had higher knowledge, attitudes, and practices. The study ultimately inferred that implementing continuous education courses for health is imperative to enhance the knowledge of dental students and practitioners regarding hepatitis B infection. The study also emphasized the importance of infection control measures, including the use of personal protective equipment, to prevent cross-infection in dental clinics [51].

The study conducted in the Gauteng province, South Africa in 2015 showed that the level of general knowledge regarding viral hepatitis among healthcare workers was inadequate, as indicated by an average knowledge score of 2.0 out of 6. However, the average scores for both practice and attitude towards notification were higher, with scores of 2.9 out of 4 and 3.3 out of 5, respectively. Lack of training, limited knowledge, a complex notification process, and excessive workload were identified as the main factors contributing to insufficient knowledge regarding viral hepatitis. The study's conclusions suggest that to enhance the level of knowledge, it is imperative to provide adequate training on viral hepatitis, the notification process, and the roles and responsibilities of healthcare workers [52].

A study conducted in Northern Ethiopia among medical students showed that the majority of study participants possessed sufficient knowledge regarding risk factors, modes of transmission, and prevention of HBV infection. Approximately 83.3% of participants demonstrated a positive inclination towards adhering to infection control protocols, while 81.7% considered it of utmost importance for all healthcare professionals to receive HBV immunization [53].

The seroprevalence of HBV infection among medical and medical science students in Northeast Ethiopia was found to be 4.2% (95% CI 2.5 to 6.1%), and for hepatitis C virus (HCV) infection, it was 0.7% (95% CI 0.0 to 1.7%). Advanced age and needle stick injuries were associated with a higher risk of HBV infection. Most students (80.1%) had adequate knowledge about HBV and HCV infection, modes of transmission, and preventive measures. However, only 50.0% of students practiced safe behavior regarding the occupational risk of viral hepatitis infection. Nearly half (49.8%) of

the students experienced a needle stick injury, only 53.2% reported the incident, and only 39.4% underwent screening tests for viral hepatitis. The study highlights the need for regular HBV vaccination among medical and medical science students before their clinical years. Despite having good knowledge about transmission and prevention measures, students exhibited inadequate practice regarding the occupational risk of viral hepatitis infection. Guidance on HBV and HCV transmission and prevention, with special emphasis on occupational accidents and post-exposure prophylaxis, is warranted [54].

A study conducted in Egypt, which included 308 barbers and 308 clients aged 20 to 40 years, found that nearly half of both barbers and clients had a moderate level of education, while a third of the clients had a higher level of education compared to only 7.8% of the barbers. The prevalence of HBsAg was 4.1% among both barbers and clients, with no significant difference between the two groups. The prevalence of anti-HCV antibodies was 12.5% among both barbers and clients. The prevalence of HBV and HCV infections among barbers was like that among their clients. This could be attributed to the good knowledge, positive attitudes, and good practices observed among many barbers, as well as the hygiene conditions in barber shops. The study revealed a similar rate of HBV and HCV infection among barbers and their clients compared to the national prevalence. Barbers appeared to have no workplace-related risk of acquiring viral hepatitis due to their good knowledge, positive attitudes, and good practices. The study highlights the importance of maintaining hygiene and implementing safe practices in barber shops to prevent the transmission of viral hepatitis [55].

A cross-sectional survey of barbers in Hyderabad, Pakistan, showed that 96.2% washed shaving instruments with antiseptic after each client, and 95.7% used a new blade for each client. However, only 36.6% of barbers knew that hepatitis could be transmitted through shaving instruments, indicating poor knowledge about diseases and modes of transmission. Out of 186 surveyed barbers, only 3.2% were vaccinated against HBV. Most barbers were aged between 15-30 years (69.9%) and had primary education (41.9%). The study found that barbers in Hyderabad lacked a detailed understanding of hepatitis transmission, despite numerous health education programs in the media in Pakistan. Barbers have low awareness of hepatitis and the risk of transmitting infectious agents through the reuse of razors and scissors. The study emphasizes the need for awareness strategies and regulation of barber practices to prevent the transmission of HBV and HCV [56].

Another study conducted in Mumbai on a sample of 163 pregnant women regarding knowledge, attitudes, and practices regarding HBV found that only 43 understood hepatitis B, indicating insufficient knowledge among participants. Healthcare workers were the main source of information. A substantial proportion of participants were unaware of the accessibility of the hepatitis B vaccine, modes of HBV transmission from mother to child, through contaminated blood,

and through unprotected sexual contact. Most participants erroneously stated that HBV is a bacterium, while a small number were aware that it is localized in the liver. None of the participants were informed about the National Viral Hepatitis Control Program (NVHCP) launched by the Government of India and its provisions. The study underscores the need to instill awareness about hepatitis B among pregnant women, considering that a considerable number of participants exhibited a lack of knowledge [57].

A study conducted in France found that the general population had a lower awareness of HBV transmission modes compared to HIV, with less knowledge about needle sharing during intravenous drug use and sexual intercourse as modes of transmission. Fear of both HBV and HIV was similar, with 20.3% of respondents reporting fear of both diseases. The perceived individual risk of infection was higher for HBV than for HIV, with 60.8% of respondents believing they have an equal or greater risk of being infected with HBV. However, HBV screening rates were lower than HIV screening rates, with only 27.4% of respondents reporting HBV screening in their lifetime, compared to 61.4% for HIV. Nearly half of the respondents (47%) reported HBV vaccination, but there was no significant difference in vaccination rates based on endemicity or intravenous drug use. The study highlights the need to improve knowledge, perceptions, and practices regarding HBV in the French general population, especially regarding sexual transmission, to enhance screening and vaccination practices [58].

The research conducted in Bantama, Ghana, showed that healthcare workers exhibited suboptimal knowledge, attitudes, and practices regarding hepatitis B. The mean scores for knowledge, attitude, and practice were  $13.691 \pm 2.81$ ,  $6.685 \pm 2.28$ , and  $2.23 \pm 1.19$ , respectively. Age, occupation, and experience were significantly associated with average knowledge scores ( $p < 0.05$ ). Significant positive correlations were observed between knowledge-attitude, knowledge-practice, and attitude-practice. The survey concluded that policy guidance and extensive health education campaigns are needed to improve knowledge, attitudes, and practices among healthcare workers [59].

A study among HBV-infected patients at the Hepatology Medical Center in Dhaka City, Bangladesh, reported that 19.3% of respondents were injectable drug users, among whom 27.6% shared needles. Additionally, 28% of respondents had a history of blood transfusion, 77% practiced polygamy, and only 38.8% used protection during sexual activity. Furthermore, 70.7% of respondents did not receive the HBV vaccine. There was a significant association between education and HBV vaccination [60].

The study conducted in Australia among drug users found that 64% had HCV infection, indicating a high prevalence of HCV among injecting drug users. Knowledge scores regarding HCV were moderate, with an average score of 6.5 out of 12. However, knowledge of modifiable factors affecting HCV disease progression was particularly low, highlighting the need for continuous education. Factors associated with higher knowledge scores included female gender, high-

er formal education, being on a current opioid substitution therapy program, and older age. The study emphasizes the need for ongoing education about HCV, especially regarding modifiable factors affecting disease progression. Improving knowledge about the long-term consequences of HCV-related liver disease and the availability of effective treatment is crucial for expanding HCV assessment and treatment among drug users [61].

The study in South Kivu, Democratic Republic of Congo, found that the overall level of knowledge about hepatitis B (HBV) and hepatitis C (HCV) among healthcare workers was low. The average proportion of correct responses regarding basic knowledge of HBV and HCV was 33.2% and 30.6%, respectively. There was no statistically significant difference in knowledge regarding age, gender, marital status, and years of professional experience among participants. However, there was a statistically significant difference in knowledge scores between professional categories, with specialists having the highest number of correct responses. The study also revealed that 42.8% of healthcare workers reported recent experiences of blood exposure accidents, with medical assistants experiencing this more frequently than doctors. Only 24.4% of participants were vaccinated against HBV, with doctors having a higher vaccination rate compared to medical assistants. The study concludes that the low level of knowledge about HBV and HCV among healthcare workers in South Kivu is a cause for concern. It highlights the need for concrete strategies to reduce the prevalence of these infections, including mandatory vaccination of all healthcare workers, improving working environments, and ongoing training on bloodborne diseases. The study underscores the importance of optimizing practitioners' knowledge to positively influence preventive attitudes toward HBV and HCV, such as vaccination and universal precautions against biological fluids [62].

The results of a study conducted among the general population in Brazil in 2016 showed that knowledge levels regarding the transmission of HBV and HCV through unprotected sexual contact were 33.1% and 34.3%, respectively. The percentage of individuals who correctly identified all modes of transmission for both HBV and HCV were substantially lower than those who accurately identified transmission routes for each specific infection. Women had a higher percentage of accurate knowledge regarding transmission routes compared to men, especially concerning dental procedures, dialysis, endoscopy, and unprotected sexual intercourse, needle sharing, as well as tattooing or piercing. The study highlighted the need to improve screening practices and knowledge about hepatitis B and C within the general population, with a specific focus on young people and those with low socioeconomic status [63].

The study conducted in Bangladesh in 2018 reported that the prevalence of hepatitis B virus infection in the adult population was 2.35%, indicating a decrease. The prevalence of hepatitis C virus infection was reported to be 0.13%. No significant relationship was found between demographic factors such as religion, locality, and occupation

of the studied population and hepatitis infection. Among the infected population, approximately 90% had an educational status below the secondary level, belonged to a low-income group, and 60% were unemployed. Most infected individuals, seeking employment, lacked adequate knowledge about the disease, modes of hepatitis virus transmission, and preventive measures, including vaccination. The study concluded that knowledge about hepatitis was poor among the infected population, emphasizing the need for awareness campaigns and preventive measures to stop the transmission of infections [64].

In South Korea, out of 1,003 study participants, 56.4% said they knew about HCV, 44.4% understood that HCV is transmissible, and 56.8% stated that HCV is curable through medication. Only 9.1% of participants disclosed that they had been tested for anti-HCV antibodies, with 11.0% obtaining positive results. Out of the 91 individuals who tested positive, a total of 8 received treatment. The most common motivations for HCV testing were health check-ups (58.5%), doctor's recommendations (11.0%), and elevated liver enzyme levels (10.7%). The study concluded that the level of knowledge regarding HCV falls below optimal levels, and the self-reported testing rate for HCV remains below 10%. However, once HCV infection is diagnosed, treatment rates appear to be high in South Korea [65].

Another study found significant gaps in physicians' knowledge about hepatitis C, especially in areas such as transmission, testing, and treatment options. The study identified several barriers to care, including limited access to testing and treatment, lack of patient education, and the stigma associated with hepatitis C. Overall, the findings highlight the need for improved physician education and increased access to testing and treatment for hepatitis C [66].

## Discussions

Identified gaps in knowledge among healthcare personnel in locales such as South Kivu and Bukavu, Democratic Republic of Congo, signal crucial deficiencies in their grasp of viral hepatitis B and C. This underscores the urgent necessity for tailored educational initiatives within healthcare systems to ensure frontline workers are equipped with accurate information regarding prevention, transmission, and treatment modalities. The hurdles encountered in vaccination efforts, notably the low uptake among healthcare workers, underscore the imperative to enhance accessibility to vaccination programs and raise awareness about the advantages of vaccination. Addressing these challenges not only safeguards the health of healthcare workers but also contributes to alleviating the overall burden of viral hepatitis within communities. The findings on risk factors and practices among specific demographics, such as barbers and clients in Gharbia Governorate, Egypt, offer valuable insights into the intricacies of disease transmission within high-risk occupational settings. Patients should be informed about the modes of transmission, symptoms, and complications of viral hepatitis B and C. A more integrated and coordinated approach is necessary to improve early diagnosis and treat-

ment of viral hepatitis. Public health policies should prioritize education and prevention of viral hepatitis through awareness campaigns. Greater collaboration between governmental and non-governmental organizations is needed to address knowledge and practice gaps related to viral hepatitis. Education about viral hepatitis should be included in school programs and public health materials. Periodic evaluation of the knowledge, attitudes, and practices of the population regarding viral hepatitis is important to adapt interventions and prevention programs. The development of adequate educational and informational resources can improve understanding and management of viral hepatitis among the general population. Greater involvement of the media in disseminating accurate and updated information about viral hepatitis is necessary. Continuous education and professional training should be priorities for doctors and healthcare workers to improve diagnosis and management of viral hepatitis.

## Conclusions

The overall level of knowledge regarding viral hepatitis B and C remains inadequate among both medical personnel and the general population. There is a growing need for education and awareness about viral hepatitis B and C among healthcare workers. The results of this systematic review underscore the complexity and diversity of knowledge, attitudes, and practices within the population regarding viral hepatitis B and C. Identifying influencing factors and specific gaps can help develop appropriate strategies to increase awareness and provide education.

## Competing interests

None declared.

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## Ethics approval

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