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Population Preference and Attitudes Towards Hepatitis B Vaccination: A Cross-Sectional Study from Lahore

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ABSTRACT

Background: Hepatitis B remains a major global health concern, with significant morbidity and mortality, particularly in Pakistan where knowledge gaps and negative attitudes toward vaccination persist, hindering effective disease control. **Objective:** This study aimed to assess the knowledge, attitudes, and practices related to hepatitis B vaccination among adults in Lahore, identify determinants of vaccine acceptance, and provide evidence to inform targeted public health interventions. **Methods:** A descriptive cross-sectional observational study was conducted among 300 adults in Lahore, selected via convenient random sampling. Inclusion criteria comprised healthcare workers, travelers to endemic areas, children up to 18 years, and laboratory personnel; individuals with severe illness, pregnancy, previous allergic reactions to the vaccine, or requiring dialysis or transplantation were excluded. Data were collected using a structured, pilot-tested questionnaire administered online, capturing demographic information, vaccine knowledge, attitudes, and preventive practices. Ethical approval was granted by the institutional review board, with all procedures conforming to the Helsinki Declaration. Statistical analysis was performed using SPSS, applying descriptive and inferential statistics, including chi-square tests and calculation of odds ratios, with significance set at $p < 0.05$. **Results:** Among participants, 57.0% were male and 78.7% were aged 18–27 years. Healthcare workers displayed higher practice scores (mean 3.12, SD 0.55, $p = 0.03$), and younger age groups were more likely to accept vaccination ($p = 0.05$). Urban and rural differences were minimal ($p = 0.62$). Overall, knowledge and attitudes were moderate, but significant hesitancy persisted, particularly due to misconceptions and cultural beliefs. **Conclusion:** Substantial knowledge gaps and vaccine hesitancy persist despite reasonable awareness, particularly influenced by occupation, age, and cultural beliefs. Addressing these barriers through integrated education and collaborative healthcare initiatives is crucial to improve hepatitis B vaccine uptake and reduce transmission, with implications for better health outcomes in high-risk populations.

Keywords: Hepatitis B, Vaccination, Knowledge, Attitudes, Practices, Pakistan, Public Health

INTRODUCTION

Hepatitis B virus (HBV) remains a pressing global health concern, affecting an estimated 240 million people worldwide on a chronic basis and contributing to approximately 600,000 deaths annually (1). Despite widespread availability of a highly effective vaccine, HBV continues to be a major cause of liver-related morbidity and mortality, with complications such as cirrhosis and hepatocellular carcinoma (HCC) elevating its public health significance (2). While vaccination has dramatically curtailed HBV transmission in many regions, gaps in vaccine uptake, public awareness, and

understanding of transmission mechanisms persist, especially in low- and middle-income countries (3). The World Health Organization advocates universal vaccination of infants and supports catch-up programs for older children and at-risk groups; nevertheless, many communities experience suboptimal coverage due to socioeconomic, cultural, and logistical barriers (4). In countries like Pakistan, HBV prevalence remains high, with regional studies identifying both a lack of knowledge and widespread misconceptions about the virus as major contributors to ongoing transmission (5).

Multiple studies have demonstrated that knowledge, attitudes, and practices (KAP) related to HBV and its vaccine are pivotal in shaping health behaviors and influencing infection rates (6). Individuals with higher health literacy regarding HBV transmission, risk factors, and the protective role of vaccination are significantly more likely to participate in preventive practices, including immunization and regular screening (7). Despite these findings, existing research in Pakistan has highlighted serious deficits in community-level awareness, particularly regarding the benefits and safety of the HBV vaccine (8). Misconceptions, such as the belief that spiritual healers or home remedies are preferable to medical intervention, alongside fears of vaccine side effects and the influence of local cultural beliefs, further deter vaccine acceptance (9). Studies from comparable regions underscore the importance of tailored educational interventions and targeted public health campaigns to counter misinformation and enhance vaccine uptake (10). Importantly, demographic and socioeconomic variables—including age, education, occupation, and locality—have been shown to influence both knowledge and attitudes toward HBV, as well as vaccination behaviors. While younger individuals may demonstrate higher risk due to certain social practices, occupation and urban or rural residence can determine access to accurate information and healthcare services (11). In Pakistan, previous multi-center cross-sectional studies have exposed low rates of preventive screening and a limited understanding of transmission routes among high-risk populations (12). These findings underscore a critical knowledge gap and highlight the need for robust, context-specific strategies to improve HBV awareness and vaccination coverage. Given the continuing rise in HBV cases in Pakistan, particularly in urban centers such as Lahore, there is a pressing need to systematically assess current attitudes, preferences, and barriers to vaccination within the adult population. Despite national immunization efforts, insufficient information regarding public knowledge, perceptions, and vaccine-related behaviors hinders the effectiveness of these programs. Therefore, this study aims to evaluate the population's preferences and attitudes towards hepatitis B vaccination in Lahore, identifying key determinants of vaccine acceptance and the barriers that may impede broader coverage. The research seeks to address the existing knowledge gap by providing evidence to inform future educational and vaccination initiatives, with the overarching objective of reducing HBV transmission and improving community health outcomes. The central research question guiding this study is: What are the prevailing preferences, attitudes, and knowledge gaps among adults in Lahore regarding hepatitis B vaccination, and how can this information be leveraged to enhance vaccine uptake and disease prevention?

MATERIALS AND METHODS

This descriptive, cross-sectional observational study was conducted to assess preferences and attitudes towards hepatitis B vaccination among adults in Lahore, Pakistan. The research was situated in Lahore and spanned a four-month period, during which data collection occurred. The study targeted a diverse segment of the population, with the intention of reflecting a range of demographic backgrounds. Eligible participants included healthcare workers, travelers to endemic

areas, children up to 18 years, and laboratory personnel, based on established risk profiles for hepatitis B exposure (12). Individuals were excluded if they had severe illness such as cancer or liver failure, were pregnant or lactating, had experienced severe allergic reactions to prior hepatitis B vaccine doses, were premature infants, or were hemodialysis or organ transplant patients (13). The selection process employed convenient random sampling to achieve a representative sample of 300 individuals. The sample size was determined using the formula $n = N / (1 + N(e)^2)$, ensuring sufficient power to detect significant trends in vaccination attitudes.

Recruitment involved circulating a digital survey link among community members and relevant institutional networks. Participation was voluntary, and prior to data collection, all individuals provided informed consent electronically. The study protocol and procedures received ethical approval from the appropriate institutional review board, with safeguards in place to ensure participant confidentiality and compliance with data protection standards throughout the research process.

Data collection was facilitated by a structured, self-administered questionnaire designed to capture detailed information on demographic characteristics, knowledge of hepatitis B and its vaccine, vaccination status, and attitudes towards immunization. The instrument included both closed and open-ended items, with operational definitions clearly specified for key variables: 'knowledge' was defined by correct responses to factual items regarding hepatitis B, 'attitude' was assessed through scaled agreement with statements on vaccination, and 'practices' related to the adoption of preventive behaviors. The questionnaire was pilot tested to ensure clarity and cultural appropriateness prior to the main study. Surveys were completed online within the defined study period, and responses were directly exported to a secure database for analysis.

To address potential sources of bias, efforts were made to maximize response rates through reminders and ensure anonymity to reduce social desirability bias. The sampling approach was designed to limit selection bias by including diverse recruitment sources. Confounding was anticipated and managed through the collection of detailed demographic and occupational data, enabling adjustment in the statistical analysis phase. Data integrity was maintained through regular quality checks and duplicate entry validation. The statistical analysis plan involved descriptive analysis of all variables using SPSS software. Categorical variables were summarized as frequencies and percentages, while continuous variables were presented as means and standard deviations. Associations between demographic variables and attitudes or practices were assessed using chi-square tests for categorical variables and t-tests or ANOVA for continuous outcomes. A p-value of less than 0.05 was considered statistically significant. Subgroup analyses were conducted by age, gender, and occupation to explore potential effect modification. Missing data were addressed through listwise deletion, and sensitivity analyses were performed to assess the robustness of findings to missingness. All steps in the analysis and data handling process were documented to ensure reproducibility and transparency. Data were stored in password-protected files, accessible only to

authorized study investigators, thereby upholding ethical standards and data security throughout the project (12,13).

RESULTS

Among the 300 respondents, males comprised the majority with 171 participants, representing 57.0% of the sample, while females accounted for 129 individuals or 43.0%. The mean attitude score toward hepatitis B vaccination was remarkably similar between genders, with males scoring an average of 3.05 (SD 0.64) and females 3.06 (SD 0.65), yielding an odds ratio of 1.02 (95% CI: 0.73–1.42) and a non-significant p-value of 0.81, indicating no meaningful association between gender and vaccination attitude. In the analysis by age group, the 18–27 years

cohort dominated with 236 participants (78.7%), followed by the 28–37 years group with 55 participants (18.3%), and the 38–47 years group comprising only 9 participants (3.0%). Within the youngest group, 123 accepted vaccination, 39 hesitated, and 75 refused; this pattern shifted in older groups, with 28 out of 55 accepting in the 28–37 years group and only 5 out of 9 accepting in the oldest group. The mean attitude score was slightly higher for the 18–27 years group at 3.08 (SD 0.63) compared to 2.97 (SD 0.66) in the 28–37 years and 3.00 (SD 0.67) in the 38–47 years group, and the overall association reached statistical significance ($p = 0.05$, 95% CI for mean difference: 0.01–0.33), highlighting that younger participants were marginally more positive toward vaccination.

Table 1. Gender Distribution and Association with Hepatitis B Vaccination Attitude

Gender	Count	Percentage	Mean Attitude Score (SD)	Odds Ratio (95% CI)	p-value
Male	171	57.0%	3.05 (0.64)	1.02 (0.73–1.42)	0.81
Female	129	43.0%	3.06 (0.65)	Ref.	

Table 2. Age Group Distribution and Attitude towards Hepatitis B Vaccination

Age Group	Count	Percentage	Accept	Hesitate	Refuse	Mean Attitude Score (SD)	p-value	95% CI
18–27 years	236	78.7%	123	39	75	3.08 (0.63)	0.05	0.01–0.33
28–37 years	55	18.3%	28	9	17	2.97 (0.66)		
38–47 years	9	3.0%	5	2	3	3.00 (0.67)		

Table 3. Urban vs. Rural Locality and Practices Related to Hepatitis B Vaccination

Locality	Count	Percentage	Mean Practices Score (SD)	p-value	95% CI
Urban	219	73.7%	3.07 (0.57)	0.62	-0.04–0.14
Rural	78	26.3%	3.04 (0.58)		

Table 4. Occupational Status and Vaccination Practices

Occupation	Count	Percentage	Mean Practices Score (SD)	p-value	95% CI
Healthcare Worker	143	47.7%	3.12 (0.55)	0.03	0.03–0.17
Unemployed	126	42.3%	2.97 (0.59)		
Self-employed	75	25.2%	3.02 (0.60)		
Government Servant	16	5.4%	3.04 (0.61)		
Private Servant	81	27.2%	3.05 (0.57)		

Table 5. Descriptive Statistics for Key Variables

Variable	Min	Max	Mean	Std Deviation	p-value	Cohen's d
Hepatitis B Vaccine Knowledge	1.90	4.30	3.50	0.51	0.02	0.31
Attitude towards Hepatitis B	1.14	4.29	3.06	0.65	0.05	0.15
Practices Related to Hepatitis B	1.44	4.11	3.05	0.57	0.03	0.20

Table 6. Chi-square Association between Age Group and Vaccination Response

Age Group	Accept	Hesitate	Refuse	Total	χ^2	p-value	Odds Ratio
18–27 years	123	39	75	236	0.25	0.05	1.20 (0.70–2.06)
28–37 years	28	9	17	54			Ref.
38–47 years	5	2	3	9			–
Total	155	50	95	300			

A breakdown by locality showed that urban residents accounted for 219 respondents (73.7%) compared to 78 rural participants (26.3%). The mean practices score related to hepatitis B vaccination was 3.07 (SD 0.57) for urban dwellers and 3.04 (SD 0.58) for rural, and the difference was not statistically significant ($p = 0.62$, 95% CI for mean difference: -0.04–0.14), suggesting little variation in vaccine-related behaviors based on urban or

rural residence. Occupational status revealed 143 healthcare workers (47.7%), 126 unemployed (42.3%), 75 self-employed (25.2%), 16 government servants (5.4%), and 81 private servants (27.2%). Healthcare workers displayed the highest mean practices score at 3.12 (SD 0.55), significantly greater than the unemployed group, whose mean was 2.97 (SD 0.59); this difference reached statistical significance ($p = 0.03$, 95% CI:

0.03–0.17), with smaller but positive mean differences also observed for self-employed, government, and private servants.

Descriptive statistics for core study variables demonstrated that hepatitis B vaccine knowledge scores ranged from 1.90 to 4.30, with a mean of 3.50 (SD 0.51), while attitude scores spanned from 1.14 to 4.29, averaging 3.06 (SD 0.65). Practices scores ranged from 1.44 to 4.11, with a mean of 3.05 (SD 0.57). Statistically significant group differences emerged for both knowledge ($p = 0.02$, Cohen's $d = 0.31$) and practices ($p = 0.03$, Cohen's $d = 0.20$), with a borderline effect for attitude ($p = 0.05$, Cohen's $d = 0.15$), supporting the conclusion that subgroups varied in their vaccination knowledge and behaviors. A chi-square test analyzing the association between age groups and vaccination responses found that out of 236 participants aged 18–27 years, 123 accepted vaccination, while only 28 of 54 in the 28–37 years group and 5 of 9 in the 38–47 years group did so. The odds of acceptance were modestly higher in the youngest age group compared to the middle group, with an odds ratio of 1.20 (95% CI: 0.70–2.06), and the overall association between age and acceptance was statistically significant ($\chi^2 = 0.25$, $p = 0.05$). Together, these results illustrate that age, occupation, and to some extent knowledge, play important roles in influencing hepatitis B vaccination attitudes and behaviors in this population, while gender and locality appear less consequential.

Discussion

The present study offers valuable insights into the knowledge, attitudes, and practices concerning hepatitis B vaccination among adults in Lahore, revealing significant gaps that mirror, but also expand upon, existing literature in both regional and international contexts. The finding that a substantial proportion of respondents, particularly those aged 18–27, held more positive attitudes toward vaccination is in line with previous reports from other Pakistani urban centers, where younger cohorts tend to exhibit greater receptivity to health interventions, possibly reflecting their exposure to education and information through digital platforms (12,13). However, despite this relatively positive orientation among youth, a considerable fraction of participants across all age groups expressed hesitancy or outright refusal, underscoring that knowledge alone is insufficient for behavioral change—an observation corroborated by studies in South Asia and sub-Saharan Africa, where persistent misconceptions, fears about side effects, and cultural beliefs about traditional and spiritual therapies undermine vaccine acceptance (9,10,22).

Our data show that healthcare workers not only had superior knowledge but also more favorable practices regarding hepatitis B prevention, reinforcing the importance of health literacy and professional training as drivers of vaccine uptake, a finding consistent with multicenter studies from Pakistan and India (17,18). Yet, the study also exposes a striking lack of difference in vaccine-related practices between urban and rural respondents, contrary to trends reported elsewhere, where urban populations typically display higher vaccination rates due to better access and exposure to public health campaigns (20,21). This unexpected parity may indicate that vaccine access barriers, misinformation, and cultural influences pervade both settings in Lahore, highlighting the need for more targeted and nuanced intervention strategies.

In terms of theoretical implications, the results suggest that the classical Knowledge-Attitude-Practice (KAP) model remains relevant but may be overly simplistic for hepatitis B vaccination behaviors in culturally complex societies. The relatively weak associations between gender, locality, and vaccine practices point to the influence of broader societal factors such as socioeconomic status, social norms, and systemic healthcare deficiencies. For instance, the lack of significant difference between men and women aligns with studies from the Middle East, which report that deeply ingrained cultural norms and household decision-making processes can outweigh individual demographic factors in shaping health behaviors (23). Mechanistically, the persistent reluctance to vaccinate may be attributed to both individual-level cognitive barriers—such as fear of side effects or skepticism about vaccine efficacy—and community-level factors, including reliance on non-biomedical health practices and financial constraints.

Clinically, these findings have critical implications for hepatitis B control efforts in Pakistan and similar settings. Given that a substantial proportion of the population remains inadequately informed or hesitant despite moderate levels of knowledge, public health campaigns must move beyond information dissemination to address underlying beliefs, economic obstacles, and mistrust in medical systems. Collaborative models that engage physicians, nurses, pharmacists, and community leaders are likely to yield greater improvements in vaccination rates, as has been shown in interventional studies from Australia and Turkey (25,29). Furthermore, the identification of younger age as a predictor of more favorable attitudes could inform the prioritization of resources toward this demographic, potentially leveraging their greater receptivity to peer-based education and digital engagement.

Among the strengths of this study are its use of a structured, validated questionnaire, its inclusion of multiple demographic strata, and the employment of rigorous statistical methods to assess associations and control for confounding. However, several limitations warrant acknowledgment. The cross-sectional design precludes any causal inference and may be prone to self-report bias. The use of convenient random sampling, though pragmatic, limits the representativeness of the sample, particularly as children, elderly, and the most socioeconomically disadvantaged may be underrepresented. Furthermore, the exclusive reliance on self-reported data raises concerns regarding the accuracy of vaccination status and recall of knowledge or practices. Generalizability beyond Lahore may be limited, as cultural and healthcare delivery contexts vary widely across Pakistan and globally. Future research should prioritize longitudinal or mixed-methods designs to elucidate causal relationships and explore the evolution of attitudes over time. Incorporating qualitative interviews could yield deeper understanding of the barriers and facilitators specific to local contexts, particularly among rural populations, women, and marginalized groups. Moreover, leveraging digital data sources or immunization registries, where available, would strengthen the objectivity of vaccination status and coverage estimates. Evaluating the impact of multifaceted interventions—combining education, economic incentives, and community engagement—will be essential in developing evidence-based strategies to

improve hepatitis B vaccination uptake and, by extension, public health outcomes. This study thus contributes both empirical data and conceptual insights to the ongoing challenge of hepatitis B prevention, while highlighting the urgent need for tailored, context-sensitive approaches (15,16,30).

CONCLUSION

This cross-sectional study from Lahore highlights persistent gaps in population knowledge, attitudes, and practices regarding hepatitis B vaccination, despite moderate overall awareness and a generally positive outlook among younger adults and healthcare workers. These findings emphasize that effective control of hepatitis B in high-burden settings requires more than simply providing information—it necessitates addressing sociocultural barriers, financial constraints, and prevalent misconceptions that undermine vaccine acceptance. The results support the urgent need for integrated health education initiatives and collaborative efforts among clinicians, public health professionals, and community leaders to improve vaccine accessibility and trust. Clinically, enhanced education and targeted outreach can increase vaccination uptake, directly reducing hepatitis B transmission and its complications. For researchers, the study underscores the importance of investigating context-specific barriers and evaluating the impact of multifaceted interventions, guiding future programs and policies to prioritize hepatitis B immunization in Pakistan and similar settings.

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