INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD)
© 2026 IJNRD | Volume 11, Issue 5, May 2026 | ISSN: 2456-4184 | IJNRD.ORG

Assessment of effectiveness of structured teaching program on post-exposure prophylaxis for hepatitis b among lab-technician students in selected college of Mangalore

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Abstract

Background: Hepatitis B, an infection preventable by vaccination, is caused by the hepatitis B virus (HBV), typically transmitted through infected bodily fluids such as blood or semen. Transmission occurs via sexual contact, sharing needles, or during pregnancy.[1] Lab technicians are directly involved in handling blood and bodily fluids, placing them at risk of occupational exposure to infectious agents like hepatitis B virus (HBV). Understanding students' awareness and comprehension of PEP protocols is essential for ensuring their safety and preventing HBV transmission in laboratory settings. Identifying knowledge gaps helps guide targeted educational interventions and strengthens infection control and public health.

Objectives: To assess the level of knowledge and evaluate the effectiveness of structured teaching program (STP) regarding post-exposure prophylaxis for hepatitis B among lab-technician students in selected colleges

Methods: A one group pretest and post-test quasi experimental design was used in
this study. The sample comprised of 60 Students pursuing DMLT or B.Sc. MLT in selected college. Data were collected and analyzed using descriptive and inferential statistics.

Result: A significant difference was found between the pre-test and post-test knowledge levels regarding the post-exposure prophylaxis for hepatitis b among lab-technician students. However, demographic variables such as age, gender, and previous information regarding PEP for Hepatitis B showed notable association.

Conclusion: The findings of the study revealed that educating the selected lab technician students was effective and helpful in enhancing their knowledge regarding post exposure prophylaxis for hepatitis B. The study findings indicate that the study intervention was effective in enhancing participants' knowledge regarding Hepatitis B and its post-exposure prophylaxis (PEP).

Key words: Assessment, Structured teaching program, post-exposure prophylaxis, Hepatitis B, laboratory technicians.

Introduction

Hepatitis B, an infection preventable by vaccination, is caused by the hepatitis B virus (HBV), typically transmitted through infected bodily fluids such as blood or semen. Transmission occurs via sexual contact, sharing needles, or during pregnancy. Age significantly impacts the likelihood of chronic infection, with

infants facing the highest risk; around 90% develop lifelong infection if exposed. However, the risk decreases with age, as only about one in three children infected before age 6 develop chronic hepatitis B.[1]

Different regions worldwide are categorized based on HBsAg prevalence: high (≥8%), intermediate (2-7%), or low (<2%) HBV endemicity. Literature indicates that India is classified as an intermediate endemicity zone. In India, approximately 40 million people endure chronic Hepatitis B infections, accentuating the nation's significant burden[2].

If someone who is not vaccinated against hepatitis B, or unaware of their infection status, comes into contact with infected blood, prompt post-exposure prophylaxis (PEP) becomes essential to prevent infection and the progression to chronic hepatitis or liver disease[3].Preventing exposure remains the primary strategy for reducing the risk of occupational blood-borne pathogen infections. This involves adhering to standard work precautions, including proper implementation of protective measures, hand hygiene practices, careful handling of sharp instruments, employing safe techniques, ensuring sterilization and disinfection, and appropriate disposal of disposables/reusables. Healthcare workers should receive comprehensive education on blood-borne infection risks and prevention measures, as well as guidance on post-exposure management and the importance of promptly seeking advice after any occupational exposure. Needle stick injuries must be reported promptly, and post-exposure prophylaxis should be based on identifying the exposure source, assessing their carrier status if feasible, and determining the worker's antibody status.[4]

In India, where it is caused by Hepatitis A, B, C, D, and E viruses. While Hepatitis A and E are typically transmitted through the fecal-oral route, leading to acute infections often seen in sporadic cases or outbreaks, Hepatitis B and C are predominantly transmitted through percutaneous or mucosal fluids, posing a risk through exposure to infected blood and other bodily fluids. Chronic infections of Hepatitis B and C can progress to serious conditions such as cirrhosis and hepatocellular carcinoma.[5]

In a quantitative study conducted in 2021 to gauge the prevalence of viral hepatitis infection in India, researchers analyzed 28 studies on Viral Hepatitis published between February 2000 and February 2021, involving a total of 45,608 participants. The study concluded that hepatitis infections pose a substantial challenge to the national healthcare system, highlighting an urgent necessity for effective public health interventions to mitigate the burden and work towards eliminating this pervasive issue.[6]

Lab technicians are directly involved in handling blood and bodily fluids, placing them at risk of occupational exposure to infectious agents like hepatitis B virus (HBV). Understanding their awareness and comprehension of PEP protocols is crucial for ensuring their safety and the prevention of HBV transmission in laboratory settings. Given the evolving nature of medical knowledge and guidelines, assessing the current level of knowledge among students provides insights into potential gaps that need to be addressed through targeted educational interventions. Ultimately, this study not only safeguards the well-being of lab technicians but also contributes to the broader goal of infection control and public health.

Materials and methods

The study was conducted in selected colleges with a sample of 60 participants. Non-probability purposive sampling technique was adopted for the selection of subjects. Individuals who can read and write English and are available at the time of collection of data were selected. Students who are not studying in the selected college and are studying other courses than DMLT or B.Sc. MLT were excluded.

A pre-experimental one group pre-test and post-test design was chosen for the research. The tool for the data collection comprised of two sections. Section A included demographic data, while section B comprised a structured knowledge questionnaire designed to evaluate the individuals' familiarity with post-exposure prophylaxis for Hepatitis B. Ethical clearance for the study was obtained from the institutional ethical committee. Oral and written consent were obtained from the study subjects. The subjects were assured of the confidentiality of their data.

A pilot study was performed involving 10 students from the selected college who met the inclusion criteria. A methodical knowledge assessment was carried out, followed by the implementation of the structured teaching program (STP) on the same day. A post-test was administered using the same structured questionnaire to assess knowledge on Hepatitis B and its Post-exposure Prophylaxis. The data were analyzed using descriptive and inferential statistics. The statistical analysis of the pilot study revealed a significant difference between the pre-test and post-test knowledge levels but no association was found in knowledge with any sociodemographic characteristics The participants and the data from the pilot study were not included in the main study.

The main study was conducted involving 60 students from selected colleges in Mangalore, based on previously mentioned criteria. The investigator self-introduced himself to the subjects and invited them to participate in the study. The subjects were explained about the purpose of the study, and informed consent was obtained.

A preliminary test was conducted using a self-administered knowledge questionnaire, followed by a systemic teaching session. Blackboard and LCD projector were used to aid comprehension of the lesson. The training session lasted one hour and was conducted in selected college and the participants were BSc. MLT students. An interactive teaching was used, allowing participants to freely ask questions and clear their doubts. Post-test was conducted seven days after, using the structured knowledge questionnaire.

Statistical analysis: The data were statistically analyzed using mean, percentage, and standard deviation. Chi-square test was used to assess the demographic data and the pre-test, post-test knowledge scores of all subjects involved in the study.

Results

The data presented in Table 1 were analyzed using descriptive statistics and summarized in terms of frequency and percentage.

Table 1: Frequency and percentage distribution of students based on their demographic data

Demographic variables	**Frequency (f)**	**Percentage (%)**
Age in Years a) 8 – 21	40	66.6
b) 2 – 24	15	25
c) bove 24	05	8.4
Gender a) ale	25	41.6
b) emale	35	58.4
Religion a) indu	28	46
b) uslim	10	17
c) hristian	22	37
Area of residence a) ural	33	55
b) rban	27	45
Educational status of father a) o formal education	4	6.7
b) rimary	7	11.6
c) econdary	19	31.7

d) igher secondary	20	33.3
e) raduation	10	16.7

Educational status of mother a) o formal education	3	5
b) rimary	6	10
c) econdary	18	30
d) igher secondary	18	30
e) raduation	15	25
Occupation of father a) griculture	11	18.3
a) usiness	15	25
b) overnment job	10	16.7
c) eacher	7	11.7
d) ny other	17	28.3
Occupation of mother		

a) ousewife	20	33.4
b) eacher	5	8.3
c) overnment job	8	13.3
d) ny other	27	45
Previous information	30	50
a) ttended workshop	8	13.3
b) ead any article in newspaper	5	8.3
c) itnessed any program in television	11	18.4
d) ny other	6	10

The sociodemographic profile of the participants showed that the majority belonged to the 18–21 years age group, followed by the 21–24 years age group, with only a small proportion being above 24 years of age. Female participants constituted a higher proportion compared to males. With respect to religion, the majority of the participants were Hindus, followed by Christians and Muslims. A greater proportion of the participants were from rural areas than urban areas. Regarding the educational status of fathers, most had completed higher secondary and secondary education, while a smaller proportion had completed graduation, primary education, or had no formal education.

Similarly, the educational status of mothers indicated that secondary and higher secondary education were most common, followed by graduation, with fewer having primary education or no formal education. The occupational status of fathers revealed that most were engaged in other occupations and business, whereas smaller proportions were involved in agriculture, government service, and teaching. Among mothers, the majority were engaged in other occupations and household work, while the remaining participants' mothers

were employed in government service and teaching. The primary source of information regarding Hepatitis B and its post-exposure prophylaxis was classroom teaching, followed by television programs, workshops, newspaper articles, and other sources.

Table 2: Frequency and percentage distribution of subjects according to their level of knowledge score regarding the Post-Exposure Prophylaxis for Hepatitis B

Knowledge level	Score	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
		Pre-test		Post-test	
Excellent	26 & above (≥81.25%)	12	20	24	40
Good	21-25 (65.6 – 78%)	18	30	17	28.3
Average	16-20 (50 – 62.5%)	22	36.7	16	26.7
Fair	11-15 (34.3 – 46.8%)	08	13.3	03	05
Poor	<11 (< 34.3%)	0	0	0	0

Table 2 shows that, out of 60 respondents, 22 (36.7%) had average knowledge, 18 (30%) had good knowledge, 12 (20%) demonstrated excellent knowledge, and 08 (13.3%) showed fair knowledge in the pre-test, while none of the respondents had poor knowledge. However, in the post-test, the majority of the subjects, 24 (40%), demonstrated excellent knowledge, 17 (28.3%) had good knowledge, 16 (26.7%) had average knowledge, and 03 (5%) demonstrated fair knowledge, while none had poor knowledge regarding the Post-Exposure Prophylaxis for Hepatitis B. this clearly indicates the effectiveness of the intervention. It is noteworthy that none of the respondents showed inadequate knowledge in the post-test.

Table 3: Mean, Standard deviation (SD), Mean difference (MD), and paired 't' test of pre- test and post-test knowledge scores

Knowledge score	Mean Score	Median	Mean %	Standard Deviation	$\bar{d}$	t value	Table value	df	p-value
Pre Test	20.5	20.5	63.95	4.9692	—	—	—	—	—
Post Test	23.7	24	74	4.834	—	—	—	—	—
Difference	3.3	3	16.13	0.9794	3.3	26.1	>2.02	59	<0.00001

Table 3 presents the paired 't' test results computed to assess the significance of difference between the mean pre-test and post-test knowledge score among a sample of 60 college students. A *P*- value less than 0.05 indicates a statistically significant difference between the pre-test and post-test mean scores, suggesting that the structured teaching program had a measurable impact on the knowledge. The mean knowledge score increased from 20.5 in the pre-test to 23.7 in the post-test, resulting in a mean difference of 3.3. Consequently, the null hypothesis is rejected and research hypothesis is accepted. The 't' value of 26.1 with a *P*- value less than 0.00001 confirms that the intervention effectively improved the participants' knowledge levels regarding the Post-Exposure Prophylaxis for Hepatitis B.

Table 4: Association between knowledge and sociodemographic proforma

Sl. No.	**Demographic variables**	**f**	**<20.5**	**≥20.5**	**df**	**χ^2**	**Table value**	**Inference**
1.	**Age in years**							
	18 – 21	40	26	14				
	22 – 24	15	3	12	2	7.64	5.991	**S** P=0.022
	Above 24	5	1	4				
2.	**Gender**							
	Male	25	18	7	1	4.76	3.841	**S** P=0.029
	Female	35	12	23				
3.	**Religion**							
	Hindu	28	12	16				

	Muslim	10	6	4	2	1.153	5.991	NS
	Christian	22	12	10				P=0.5618
4.	**Area of residence**							
	Rural	33	14	19	1	1.683	3.841	NS
	Urban	27	16	11				P=0.1945
5.	**Educational Status of father**							
	No formal education	04	2	2				
	Primary	07	4	3				
	Secondary	19	9	10	4	0.803	9.488	NS P=0.9379
	Higher secondary	20	8	12				
	Graduate	10	4	6				
6.	**Educational status of mother**							
	No formal education	03	2	1				
	Primary	06	3	3				
	Secondary	18	9	9	4	2.888	9.488	NS P=0.5766
	Higher secondary	18	11	7				
	Graduate	15	5	10				
7.	**Occupation of father**							
	Agriculture	11	5	6				
	Business	15	8	7				
	Govt. Employee	10	4	6	4	0.967	9.488	NS P=0.9147
	Teacher	07	4	3				
	Any other	17	7	10				

8.	**Occupation of mother**							
	Housewife	20	13	7				
	Teacher	05	1	4				NS
	Govt. Employee	08	4	4	3	3.933	7.815	P=0.2687
	Any other	27	12	15				
9.	**Previous Information**							
	Studied in class	30	10	20				
	Workshop	08	6	2				
	News article	05	4	1	4	11.43	9.488	**S** P=0.022
	TV programme	11	7	4				
	Any other	06	3	3				

*****Significant at P < 0.05, S = Significant Association, NS = No Significant Association**

Table 4 illustrates the Chi-square analysis result which unveil a noteworthy revelation. It confirms a significant association between participants' knowledge levels and certain sociodemographic proforma, including age, gender, and previous information on Post exposure prophylaxis on Hepatitis B. However, no significant association was established with the remaining variables. As a result, the null hypothesis (H_{02}) is rejected, affirming the research hypothesis's acceptance (H_2).

Discussion

The results of the present study demonstrate a significant improvement in the knowledge levels of the selected college students regarding the Post-Exposure Prophylaxis for Hepatitis B. The demographic data on age showed that the majority of participants belonged to the 18–21 years age group, followed by the 21–24 years age group, with only a small proportion above 24 years. These findings are supported by the study conducted by Mesfin Y.M. and Kibret K.T. among Medical and Health Science students in Haramaya University, Ethiopia, which also reported that the majority of participants were within the younger age group.[8]

Female participants constituted 58.3% of the study sample, while 41.6% were male. This finding is consistent with the study by Garg M et al., which also reported a higher proportion of females (66.8%) compared to males (33.2%).[7]

A majority of the participants (55.5%) were from rural areas, while 45% belonged to urban areas. This finding is in contrast to the study conducted by Mesfin Y.M. and Kibret K.T., which reported that most participants (55.6%) were from urban areas, followed by semi-urban (22.7%) and rural areas (21.7%).[8]

In the pre-test, 36.7% of participants had average knowledge, followed by 30% good knowledge, 20% excellent knowledge, and 13.3% fair knowledge, with none having poor knowledge regarding post-exposure prophylaxis for Hepatitis B. Overall, 86.7% had adequate knowledge, while 13.3% had inadequate knowledge. The mean score was 20.5 ± 4.9692, with a mean percentage of 63.95% and median of 20.5. These findings are comparable with previous studies conducted in Ghana, Northeast Ethiopia,[9] coastal Karnataka, and rural Maharashtra, which also reported adequate baseline knowledge and similar mean scores.[10]

In the post-test, 40% of participants had excellent knowledge, followed by 28.3% good knowledge, 26.7% average knowledge, and 5% fair knowledge, with none having poor knowledge. After the structured teaching programme, 95% demonstrated adequate knowledge, while only 5% had inadequate knowledge. The mean post-test score was 23.7 ± 4.834, with a median of 24 and a mean percentage of 74%. These findings are supported by studies conducted by Zarei et al[11]., which showed improved knowledge levels after training, by Singh et al.[12], where 85% of participants had adequate knowledge post-intervention, and by Narh et al., who reported a mean knowledge percentage of 73.6%, which is comparable to the present study.[13]

The paired sample *t*-test showed a statistically significant increase in knowledge scores from pre-test (20.5 ± 4.9692) to post-test (23.7 ± 4.834) with $t(59) = 26.1$, $p < 0.00001$. The mean difference was 3.3 ± 0.9794, indicating a 16.13% improvement in knowledge after the structured teaching programme. These findings are supported by the study conducted by Nankya Mutyoba et al., which also reported a significant post-intervention improvement in HBV knowledge scores among healthcare workers.[14]

A significant association was found between pre-test knowledge and selected sociodemographic variables such as age ($\chi^2 = 7.64$, $p < 0.022$), gender ($\chi^2 = 4.76$, $p < 0.029$), and previous information on PEP for Hepatitis B ($\chi^2 = 11.43$, $p = 0.022$). This indicates that knowledge levels varied according to age group, differed between genders, and were higher among participants who had prior information regarding PEP. These findings are supported by previous studies from Northern Vietnam, Pakistan, and Uganda, which similarly reported significant associations between knowledge and these variables.[15]

Conclusion

From the present research, it is evident that the structured teaching programme was effective in increasing the knowledge of students regarding the Post-Exposure Prophylaxis for Hepatitis B. The study concluded that there was a significant association between pre-test knowledge and selected sociodemographic variables such as age, gender, and previous information regarding post-exposure prophylaxis for Hepatitis B. Participants with prior information demonstrated better knowledge levels.

The outcome of this study has implications for nursing education, practice, administration and research.

Nursing practice

In today's healthcare environment, the prevention of occupational infections such as Hepatitis B is of increasing importance, as it poses a serious risk to healthcare workers, especially nursing professionals, due to accidental exposure to blood and body fluids. Addressing this issue requires proactive education, strict adherence to safety protocols, and increased awareness regarding post-exposure prophylaxis (PEP). Community health nurses play a vital role in bridging knowledge gaps by educating students, healthcare staff, and the public about the risks of Hepatitis B and the importance of immediate PEP following exposure. They contribute through organizing awareness programmes, vaccination drives, workshops, counselling, advocacy for safe needle practices, and timely response to exposure-related incidents. Through their active involvement in both academic and clinical settings, nurses significantly reduce the risk of infection, improve preparedness among healthcare workers and students, and thereby contribute to better public health outcomes.

Nursing education

Incorporating structured teaching on Hepatitis B, including its transmission, prevention, and post-exposure management, into the nursing curriculum is essential for preparing future nurses. The significant improvement in knowledge levels after the intervention highlights the need for comprehensive and interactive teaching strategies. Nurse educators should emphasize practical, scenario-based learning methods such as simulations, role-plays, and case studies, while thoroughly covering topics like standard precautions, occupational exposure management, and immunization. Such educational approaches equip nursing students with accurate and updated knowledge, enabling them to respond confidently in clinical situations, reduce occupational risk, and promote safety within healthcare settings.

Nursing administration

Nursing administration plays a key role in planning, implementing, and evaluating educational programmes on occupational hazards such as Hepatitis B. Administrators must ensure regular training on PEP and infection control, maintain vaccination records, provide adequate teaching materials, and establish clear policies for reporting and managing exposure incidents. Their leadership is essential in promoting a culture of safety, awareness, and preparedness among nursing students and healthcare staff.

Nursing research

Nursing research plays a vital role in improving knowledge, attitudes, and practices related to occupational health risks such as Hepatitis B. The present study demonstrates that structured teaching significantly enhances knowledge, highlighting the need for continued research on effective educational strategies. Future studies can focus on long-term knowledge retention, compare different teaching methods, and examine

factors influencing the application of PEP in clinical practice. Such research will support evidence-based practice, guide curriculum development, and promote safer working conditions for healthcare professionals.

Conflict of interest

Nil

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