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PREVALENCE AND VACCINATION STATUS OF HEPATITIS B AMONG CLINICALLY EXPOSED AND NON-EXPOSED HEALTHCARE WORKERS OF A TERTIARY CARE HOSPITAL OF FAISALABAD, PAKISTAN

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Abstract

Background: *Health care workers (HCWs) are at high risk of Hepatitis B virus (HBV) transmission. HBV vaccination for HCWs is a key component of the WHO Hepatitis B Elimination Strategy 2016–2021. Vaccinating against Hepatitis B is mandatory for all HCWs. The health care setup in Pakistan has no specific guidelines for the Hepatitis B vaccination of HCWs. Different studies have reported different rate for HBV vaccination. This study aimed to determine Hepatitis B vaccination status and vaccination status in HCWs of public sector hospitals at Faisalabad, Pakistan. Thiscross-sectional study was conducted in public sector hospitals at Faisalabad, Pakistan. A total of 350 HCWs were tested for Hepatitis B status and asked about the HBV vaccination coverage using a structured tool. Data was analyzed using SPSS version 25 and p-value <0.05 was taken as significant. From total 350 HCWs, 7(2.3%) were positive for Hepatitis B. There were 135 (45%) totally vaccinated, 54 (18%) partially vaccinated and 111(37%) non- vaccinated HCWs. From total 134 full vaccinated, 59 were doctors, 28 were nursing staff, 48 allied health care workers. HBV coverage among HCWs in Faisalabad was low. Hepatitis B vaccination should be made a job entry requirement to achieve more complete vaccination numbers.*

Introduction

Hepatitis B viral infection is a significant global healthcare problem. Hepatitis B virus is the major cause of chronic liver disease with 20-30% of individuals developing complications including liver cirrhosis and hepatocellular carcinoma (1). According to WHO, 350-400 million individuals are chronically infected with Hepatitis B and an estimated 887,000 deaths have been reported yearly worldwide (2, 3). The prevalence rate of Hepatitis B is high in regions of Africa, The western Pacific and Europe (4, 5). The transmission of virus is mainly perinatal from mother to child and horizontally through sexual contact, mucosal surface contact and IV drug abusers. WHO has adopted a goal to reduce

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rates of viral hepatitis by 90% and mortality by 65% before 2030 (6).

Southeast Asia is one of the regions with high rate of Hepatitis B infection(7). Pakistan has an HBV infection prevalence of 2–7%. Each year, it is predicted that more than 10 million people in Pakistan contract HBV infection(8). Hepatitis B can be prevented by vaccines that are safe and effective. The Hepatitis B vaccine became available all over the world in 1980s. However, the coverage of Hepatitis B vaccination remains low in developing countries. The WHO Southeast Asian region (SEAR) estimated that nine of 11 countries in SEAR achieved >90% of Hepatitis B vaccination coverage nationally during the year 2019(5).

Healthcare workers including doctors, nursing staff and students have increased risk of acquiring Hepatitis B infection. The risk of transmission is greater due to exposure to infectious material, blood, body fluids and contact with infected patients. According to different studies conducted in Pakistan, 73% of Health care workers in public and private hospitals are completely vaccinated against Hepatitis B(9). But many of them are either unaware of vaccination of hepatitis B or have no access to vaccine.

Unfortunately, in Pakistan only a limited number of research studies have been published regarding Hepatitis B prevalence, knowledge, vaccination and post exposure prophylaxis in nursing students(10). Allied Hospital is a tertiary care hospital and serves as a primary teaching hospital of Faisalabad Medical University. The main objective of this study is to assess the prevalence and vaccination status of Hepatitis B in nursing students at Allied Hospital Faisalabad. Furthermore, it is also aimed to look into the knowledge and attitude of nursing students towards the importance of vaccine and to reveal reasons associated with not being vaccinated.

Materials and Methods

This cross-sectional study was conducted in one year from July 2024 to June 2025. It was conducted at NIH-Health Research Institute, Research Centre, Faisalabad Medical University (FMU), Faisalabad. The study sample included 350 healthcare workers divided into two groups. A total of 350 healthcare workers were included in study. Patients were divided into two groups. Group exposed patients that were in contact with blood/clinical samples of patients and Group 2 were non-exposed HCWs that were not in contact with blood/clinical samples of patients with a minimum of 2 years. Ethical approval was obtained for this study from the Ethical Review Committee (ERC), FMU, Faisalabad, before starting it. In addition, informed consent forms were taken from all participants in this research. A predesigned form was administered to the participants to record information about their demographic characteristics, past history, family history, vaccination status. In case vaccination was incomplete, they were supposed to state possible reasons for not being vaccinated. Next, about 5ml of their blood was taken to test HBsAg (hepatitis B surface antigen). The serum was tested for HBsAg antibodies with a rapid diagnostic strip by Determine™ HBsAg (Abbott Laboratories) according to the manufacturer's instructions. Data were entered and analyzed in SPSS 21.0 by descriptive statistics and the chi-square test.

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Results

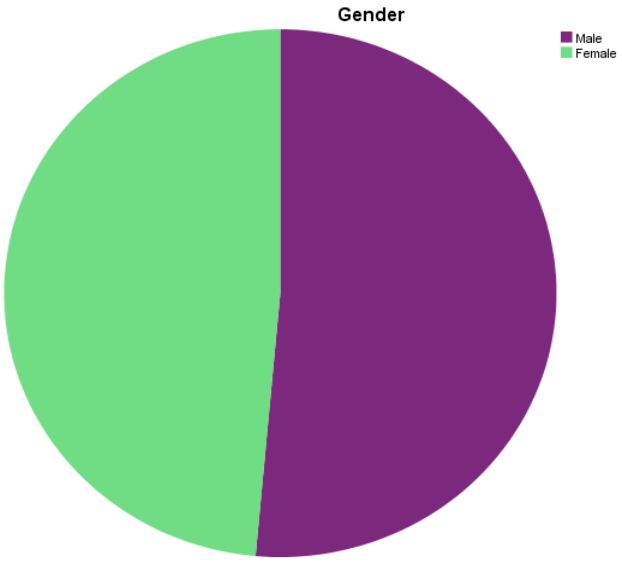
Demographic Information:

A total of 350 HCWs from Allied Hospital Faisalabad participated in this study. Among them 48.6% were males and 51.4% were females. Age of the HCWS ranged from 25 to 45 years. Personal history of jaundice was quite low while the family history of hepatitis was 18.9% also shown in pie charts. Healthcare Workers from different departments were included in the research as shown in table.

		Frequency	Percent
Gender	Male	180	51.4
	Female	170	48.6
Age Groups	≤25	34	9.7
	26-35	220	62.9
	35-45	75	21.4
	>45	21	6.0
History of Jaundice	Yes	20	5.7
	No	330	94.3
Family history of Jaundice	Yes	66	18.9
	No	284	81.1

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	350	20	56	34.43	7.273
Valid N (listwise)	350				



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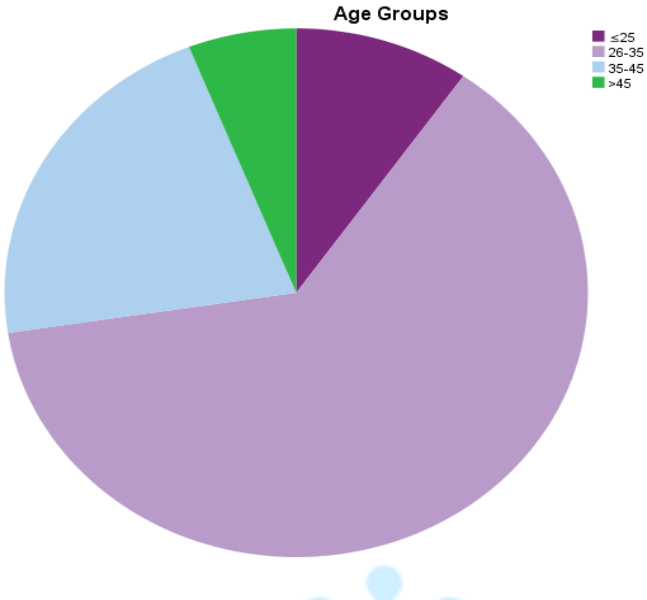

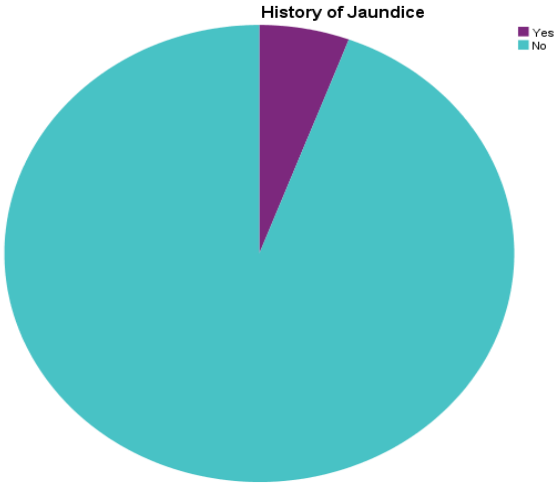

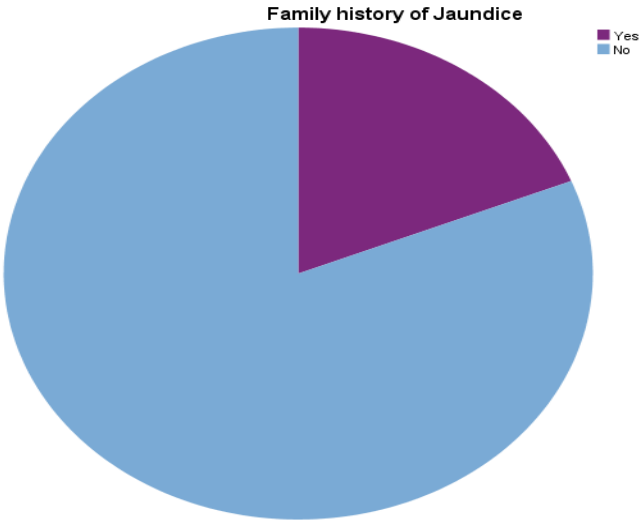

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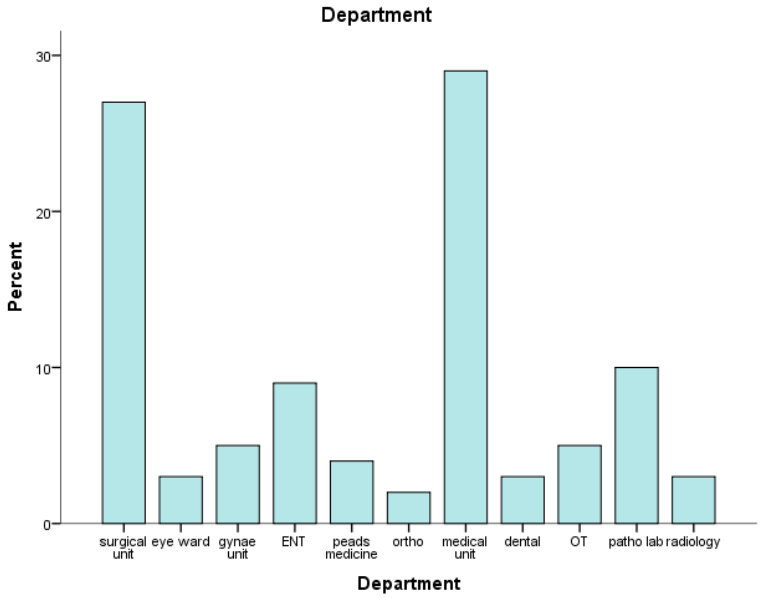
Departments		Frequency	Percent	Valid Percent
Valid	Surgical unit	95	27.0	27.0
	Eye ward	11	3.0	3.0
	Gynae unit	18	5.0	5.0
	ENT	32	9.0	9.0
	Pead medicine	14	4.0	4.0
	Ortho	7	2.0	2.0
	Medical unit	102	29.0	29.0
	Dental	10	3.0	3.0
	OT	18	5.0	5.0
	Patho lab	35	10.0	10.0
	Radiology	8	3.0	3.0
	Total	350	100.0	100.0



The total number of healthcare workers is 350 of which 180 are males and 170 are females. Males and females constituted 56.8% and 43.4% and 46.3% and 53.7% respectively in the exposed and the non-exposed group with 175 respondents in each. This means that the prevalence of the exposed group was higher among the males than it is among the females. The correlation between the exposure status and gender proved to be significant (p = 0.034) which indicates that gender could be a factor to affect exposure risk among healthcare workers. There were four age groups with the participants categorized into 25 years or less, 26 to 35 years, 36 to 45 years and over 45 years. Most of the exposed participants (57.1%) were aged between 26 and 35 years with 31.4% being aged 36 to 45 years. The non-exposed, on the contrary, constituted mainly the 26-35 years at 68.6% with 18.9% being the 25 and under. Only a few subjects in both classes were included in the >45 age group. The relationship between the age groups and exposure status was found to be extremely significant (p = 0.000) showing that the variable age is an

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important factor in defining exposure among healthcare workers where the younger workforce stands a higher chance of being exposed.

			Group		Total	p-Value
			Exposed	Not Exposed		
Gender	Male	Count	99	81	180	0.034
		% Within Group	56.6%	46.3%	51.4%	
	Female	Count	76	94	170	
		% Within Group	43.4%	53.7%	48.6%	
Total		Count	175	175	350	
		% Within Group	100.0%	100.0%	100.0%	

			Group		Total	p-Value
			Exposed	Not Exposed		
Age Groups	≤25	Count	1	33	34	0.000
		% Within Group	0.6%	18.9%	9.7%	
	26-35	Count	100	120	220	
		% Within Group	57.1%	68.6%	62.9%	
	35-45	Count	55	20	75	
		% Within Group	31.4%	11.4%	21.4%	
	>45	Count	19	2	21	
		% Within Group	10.9%	1.1%	6.0%	
Total		Count	175	175	350	
		% Within Group	100.0%	100.0%	100.0%	

The association between the exposure and awareness of hepatitis B status was statistically significant (p = 0.018).

			Group		Total	p-Value
			Exposed	Not Exposed		
Prevalence of Hepatitis B	Yes	Count	8	1	9	0.018
		% within Group	4.6%	0.6%	2.6%	
	No	Count	167	174	341	
		% within Group	95.4%	99.4%	97.4%	
Total		Count	175	175	350	
		% within Group	100.0%	100.0%	100.0%	

66.3 % of the exposed HCWs were conscious of their hepatitis B status and remaining 33.7% were unaware. Moreover 77.7 % of the non-exposed group were aware of the hepatitis B status and 22.3% were unaware in non-exposed group. The outcomes indicate improved health

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education and participation of people clinically exposed.

In our research study, the general HBsAg positivity rate stood at 2.9%. The prevalence rate of a positive sample among exposed healthcare workers was 5.1% against 0.6% in the non-exposed group. This was statistically significant (p = 0.010) and implies that there was a great relationship between clinical exposure and hepatitis B infection.

				Group		Total	p-Value
				Exposed	Not Exposed		
if known, positive or negative	Positive	Count		9	1	10	.010
		% within Group		5.1%	0.6%	2.9%	
	Negative	Count		166	174	340	
		% within Group		94.9%	99.4%	97.1%	
Total		Count		175	175	350	
		% within Group		100.0%	100.0%	100.0%	

History of vaccination demonstrated an important correspondence to exposure. Compared with non-exposed participants, more than half of all exposed HCWs (56.8 %) were completely vaccinated, with only 44.5 % of the latter having received the full three-dose cycle. The proportion of unvaccinated members was very high in the non-exposed than in the exposed group (42.9% vs 16.9%) with a marked p- value of 0.009. This indicates the huge disparity in uptake of vaccines though occupation exposure.

			Group		Total	p-Value
			Exposed	Not Exposed		
What is your current status of Hepatitis B	Known	Count	116	136	252	
		% within Group	66.3%	77.7%	72.0%	
	Unknown	Count	59	39	98	
		% within Group	33.7%	22.3%	28.0%	
Total		Count	175	175	350	
		% within Group	100.0%	100.0%	100.0%	

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			Group		Total	p-Value
			Exposed	Not Exposed		
Vaccination status against Hepatitis B	Fully Vaccinated	Count	99	74	173	.009
		% within Group	56.6%	42.3%	49.4%	
	Partially Vaccinated	Count	21	39	60	
		% within Group	12.0%	22.3%	17.1%	
	Not Vaccinated	Count	55	62	117	
		% within Group	31.4%	35.4%	33.4%	
Total		Count	175	175	350	
		% within Group	100.0%	100.0%	100.0%	

			Group		Total	p-Value
			Exposed	Not Exposed		
when vaccine was done?	Less than 5	Count	37	48	85	0.390
		% within Group	64.9%	72.7%	69.1%	
	5 to 9 years	Count	2	0	2	
		% within Group	3.5%	0.0%	1.6%	
	10 to 14 Years	Count	3	2	5	
		% within Group	5.3%	3.0%	4.1%	
	More than 15	Count	15	16	31	
		% within Group	26.3%	24.2%	25.2%	
Total		Count	57	66	123	
		% within Group	100.0%	100.0%	100.0%	

The screening of individuals before vaccination was practiced more often among exposed HCWs (74.5%) than non-exposed HCWs (49.5). This relationship was statistically significant (p = 0.003), which means that clinical staff have higher chances of upholding recommended hepatitis B screening procedures prior to immunization.

	Group	Total	p-Value

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				Exposed	Not Exposed		
Was HBsAg checked before vaccination or not?	Checked	Count		35	48	83	0.003
		% Group	within	74.5%	49.5%	57.6%	
	Not Checked	Count		12	49	61	
		% Group	within	25.5%	50.5%	42.4%	
Total		Count		47	97	144	
		% Group	within	100.0%	100.0%	100.0%	

The difference between number of doses received by various groups was found to be absolutely high (p = 0.000). Also, among those workers exposed to HCW, 69.5% received three doses, and a smaller proportion (58.2) of the non-exposed workers had all the doses. Also, there was a low vaccine coverage among non-clinical staff and support workers where 25.8 % of them did not get a single dose.

				Group		Total	p-Value
				Exposed	Not Exposed		
How many dosed of vaccine you received?	1 shot	Count		2	23	25	0.000
		% Group	within	3.6%	30.7%	19.2%	
	2 shots	Count		12	9	21	
		% Group	within	21.8%	12.0%	16.2%	
	3 shots	Count		41	43	84	
		% Group	within	74.5%	57.3%	64.6%	
Total		Count		55	75	130	
		% Group	within	100.0%	100.0%	100.0%	

A percentage of 18.5% of participants had received the post-vaccination anti-HBs titer examination done. The percentages of the exposed (20.3%) and non-exposed (17.6%) did not differ significantly (p = 0.283). This implies that there is a general negligence when it comes to confirming immunity after vaccination by institutions.

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				Group		Total	p-Value
				Exposed	Not Exposed		
Did you check antibody titer after vaccination?	Yes	Count		12	16	28	
		% Group	within	21.8%	16.7%	18.5%	
	No	Count		43	80	123	
		% Group	within	78.2%	83.3%	81.5%	
Total		Count		55	96	151	
		% Group	within	100.0%	100.0%	100.0%	.283

Among the 100 individuals that were trained to check their antibody status, 3 percent of them showed a constructive antibody status and 97 persons indicated a negative status of antibodies. The number of antibody positive cases had difference between the exposed and non-exposed groups with 6.7 and 1.4 percent, respectively. But there was no statistical significance in this difference (p = 0.213).

				Group		Total	p-Value
				Exposed	Not Exposed		
what was the status of antibody	Positive	Count		2	1	3	
		% Group	within	6.7%	1.4%	3.0%	
	Negative	Count		28	69	97	
		% Group	within	93.3%	98.6%	97.0%	.213
Total		Count		30	70	100	
		% Group	within	100.0%	100.0%	100.0%	

The justifications of lack of vaccination varied considerably among the groups (p = 0.000). Exposed HCWs mainly mentioned the reason to be lack of time, whereas non-exposed ones often answered that they did not know about this vaccination, or that they were afraid of being injected or that they had no necessity. These results point to the necessity of specific education and encouragement approaches, in particular, the support and non-clinical personnel.

			Group		Total	p-Value
			Exposed	Not Exposed		
Reason for not being Vaccinated	Unawareness	Count	10	29	39	
		% within Group	8.5%	23.4%	16.2%	
	Consider	Count	4	26	30	

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	Unimportant	% within Group	3.4%	21.0%	12.4%	
		Count	27	21	48	
	Fear of Need	% within Group	23.1%	16.9%	19.9%	0.000
		Count	76	48	124	
	Lack of Time	% within Group	65.0%	38.7%	51.5%	
		Count	117	124	241	
Total		% within Group	100.0%	100.0%	100.0%	

Discussion

Hepatitis B has remained as a major occupational risk to the healthcare professionals, especially in a health system where resources are limited such as the health system in Pakistan. Coverage, screening, and follow-up gaps are present systematically despite the existence of effective vaccination, because of the lack of proper institutional policies incorporation, barriers, and lack of awareness programs. Our investigation presented positive and alarming tendencies concerning the situation of hepatitis B seroprevalence, hepatitis B vaccination, and hepatitis B prevention in the cluster of healthcare workers. These results raise crucial issues of failing control over infections and mark the necessity to intervene in the health system immediately.

In our research, the general prevalence of HBsAg was 2.9%, but there was significantly higher prevalence of the affected group amongst the exposed healthcare workers (5.1%) than among the non-exposed persons (0.6%) ($p = 0.010$). This shows that occupational exposure is a significant risk factor of hepatitis B transmission. Also, the association between the exposure and awareness of hepatitis B status was statistically significant ($p = 0.018$).

The same occurred in another Pakistani study conducted in multicentric settings where the positivity of HBV was higher in exposed medical personnel compared to administrative ones once again confirming the occupational character of the disease (11). The findings align with the global ones, with the research in Nigeria and Ethiopia reporting the prevalence similar to that in the frontline workers (12).

The level of vaccination in our research was inadequate. A low percentage, 49.4% of participants has been full vaccinated, and statistically significant differences in the group of exposed and non-exposed participants were observed ($p = 0.009$). This is an indication of the structural problems of the absence of institutional requirements to receive vaccines, documentation problems, and access inadequacies to vaccine services. A Karachi study reported similar results, showing that time is one of the obstacles to vaccination and there are no institutional programs (13). Worldwide, failure to get healthcare workers fully immunized is also explained by the existence of similar hindrances, such as low levels of awareness, attitude to safety risks posed by vaccines, or the perception of low risks (14)(15).

There was also significant relation between knowledge of hepatitis B and exposure group ($p = 0.012$), more exposed HCWs knew their status. There is a selective education in the hospitals in that non-clinical and non-exposed staff are not offered the regular testing and awareness sessions. HBsAg pre-vaccination screening was also highly prevalent among the exposed group ($p = 0.003$), which once again suggests that, in its prevention methods, administrative and support staff might be overlooked. The practice coincides with the results of a Malaysian hospital, in which the head of medical workers was screened mainly at medical interns and nurses and not at hospital staff in general (16).

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The association with exposure group was also found with the number of vaccine doses received (p = 0.000), whereby the exposed staff was more likely to have received three doses. Conversely there was a great percentage of the non-exposed that had taken just a single dose or even two doses or non doses.

One gap that was of particular concern in our study was the very low proportion (18.5 %) of antibody titer testing after vaccination and with no significant difference among groups (p = 0.283). Healthcare workers can also be misled to think that they had been immunized without serologic confirmation. This lapse is widespread throughout South Asia where post-vaccination testing happens infrequently and has not been institutionalized because of expenses, time, logistics, and the lack of processes (17).

The difficulty not to be vaccinated differed considerably among groups (p = 0.000). More than half of the exposed HCWs referred to lack of time, and the non-exposed HCWs cited unawareness or low-perceived importance. These factors can be seen as a symptom of larger structural problems like the inability to provide institutional motivation, inefficient policy execution, as well as the lack of perceived risk in the activities of support staff. In Nepal, a 2020 study with similar findings reported that the absence of a policy execution and monitoring mechanism to be one of the key factors preventing the full vaccination experience (18).

All in all, our results emphasize that inaccurate implementation of preventive strategies rather than the lack of knowledge is the problem. Certainly, concepts of vaccination and follow-up can be grouped and organized for clinical personnel at the expense of non-clinical ones which work in the same premises and are unattended. This gap would be closed through compulsory pre-employment screening and vaccination against HBV, mass sensitization across the members of staff, and post-inoculation antibody screenings as well as digital monitoring features. Such changes are necessary not only to achieve the WHO 2030 elimination targets on hepatitis B, but also to make both healthcare workers and patients safe.

Conclusion

Our research shows that there is a reason to be concerned about serious deficits in hepatitis B prevention among healthcare providers, particularly those associated with full vaccination, vaccination follow-up, and institutional screening rates. The large correlations between the exposure status and the key variables indicate disparity in regard to the care about the clinical and non-clinical staff in the healthcare system. In order to minimize hepatitis B transmission in the occupation, hospitals should implement an integrated strategy, consisting of compulsory vaccination, screening, post-immunization titration and widespread educational activities. Unless structures are reformed, universal protection against HBVs among healthcare workers will be a far-fetched dream.

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