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To assess the Vaccination status Against Hepatitis B among Medical, Dental students and HCWs in Isra University

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Abstract:

Background/objective: hepatitis b virus (HBV) is a blood borne virus responsible for potentially life-threatening liver infection and a major hazard for healthcare workers (HCWS). HCWS should have proper knowledge regarding risks and transmission of HBV as they are at higher risk than normal population. This study was created to evaluate attitude and status of HBV vaccination and re-immunization among hcws.

Methods: in this cross-sectional study, we assessed hepatitis b vaccination status among 300 medical and dental students, and healthcare workers (HCWS) at isra university hospital. Utilizing stratified random sampling ensured representation across diverse healthcare professionals. Survey forms, both electronic and printed, collected data on demographics, vaccination status, booster dose awareness and status, and antibody titer testing. Data analysis using SPSS v25 employed descriptive and inferential statistics to illuminate vaccination trends and potential demographic associations. Ethical considerations, including informed consent and confidentiality protocols, were rigorously followed under irb approval from Isra university.

Results: out of 297 participants included in this study 177 (59.6%) were vaccinated against HBV with the highest frequency seen in doctors (28.3%). Of the vaccinated HCWS, 51 (17.2%) had received a booster dose and out of all the participants, 63 (21.2%) had their antibody levels (titres) checked.

Conclusion: A significant proportion of HCWS is fully vaccinated. Given that a substantial fraction of HCWS were not adequately protected and educated, more aggressive awareness campaigns, regulations, and universal screening should be required of HCWS. This includes administering a booster dose and determining anti-HBS titer levels.

Keywords: Hepatitis b virus, booster dose, titre, healthcare workers, Pakistan

Introduction:

Viral Hepatitis affects millions of people around the globe. More than two billion people world¬wide show serological evidence of exposure to this virus. The World Health Organization (WHO) estimated that 296 million people were living with Hepatitis B in 2019 while 1.5 million had contracted the infection and 1.1 million people worldwide died that year due to this infection and its effects (1).

Hep B infection is still one of the primary challenges in underdeveloped nations, despite a significant decrease in occurrence following the introduction of immunization and changes to high-risk practices. Numerous underdeveloped nations frequently deal with serious health and sanitation issues that make them more vulnerable to the spread of these viruses(2).

The best defense against Hepatitis B infection and its effects is vaccination with the Hep B vaccine, and as such, selective vaccination of at-risk individuals has been recommended. Infants as well as children <19 should receive Hep B vaccine hours as recommended by Advisory Committee on Immunization Practice (ACIP)

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(3) (4). Adults aged 19-59 and high-risk adults aged >60 are advised to get immunized. High risk individuals include people at risk of contracting this virus by sexual contact, by percutaneous or mucosal exposure to blood and body fluids, people with chronic liver disease, individuals at risk of exposure to blood and body fluids, international travelers to countries where Hep B is endemic, people with HIV and Hep C virus infection (5).

According to Centre of Disease Control (CDC), the routine booster is not recommended for general healthcare workers (HCWs), but if accidental exposure occurs then HCWs should often prefer to have their blood test with radio-immunoassay test (antibody titer test) for anti-HBs, if test results show less than 10 serum ratio units then HCWs should take booster dose for HBV antigen (6).

The prevalence of HBsAG range varies by region according to National library of Medicine. Studies show that southern Punjab, interior Sindh, district Thatta and some areas of Lahore have a very high HBV prevalence of >5% (Asghar MS, 2021). Numerous authors have examined the prevalence of HBsAG infected among Pakistani HCWs; however, there hasn't been a thorough investigation on the vaccination status and awareness of HCWs. The goal of the current study was to evaluate the immunization trends of medical students and healthcare workers at a medical school and the hospital that is linked with it. Additionally, the study sought to contribute to local data due to the insufficient availability of relevant knowledge in the region.

Objective: Objective is to study the immunization status and to assess awareness regarding booster dose and effective immunization against Hep b in HCWs and medical students at Isra university hospital. Additionally, this study aims to explore reasons for non-vaccination and analyze immunization trends across different medical groups to identify areas for focused intervention.

Methods: This research employed a cross-sectional descriptive study design to assess Hepatitis B vaccination status among medical and dental students and healthcare workers (HCWs) at Isra University Hospital, with a sample size of 300 participants. Included medical and dental students and HCWs who voluntarily participated, while those with incomplete surveys or who opted out were excluded.

Data was collected through printed and electronic surveys validated by experts. Participants were divided into distinct groups: Doctors, House officers, Students and Others healthcare workers (e.g. clinical support staff, Dental and OT technicians, medical housekeepers, paramedics etc.) The survey included questions on demographics, year as well as status and awareness of vaccination and booster doses and antibody titer testing. Responses were analyzed using SPSS v25, applying descriptive statistics for summaries and chi-square tests for associations. Ethical considerations included informed consent, confidentiality, and IRB approval from Isra University. The clarity and reliability of the survey was tested and refined before implementation.

Results:

A total of 300 printed questionnaire forms and e-forms were distributed among the HCW's and medical students, in which 177 HCW's received and completed the printed forms and 120 students responded on e-forms, so 297 total responses were collected from the HCWs that including doctors and clinical staff and the final year medical students of MBBS and BDS of Isra university.

The majority of the responders belonged to the 18-25 year age group, in which 167(56.2%) were females while 49(16.5%) were males followed by 9.1% females and 6.1% males in 26-35 age group and 5.1% females and 7.1% males in age group ranging 36 and above. The participants were divided into 4 groups respectively as Doctors, House officers, students and other healthcare workers.

Table 1: Vaccination and booster dose status of four subgroups.

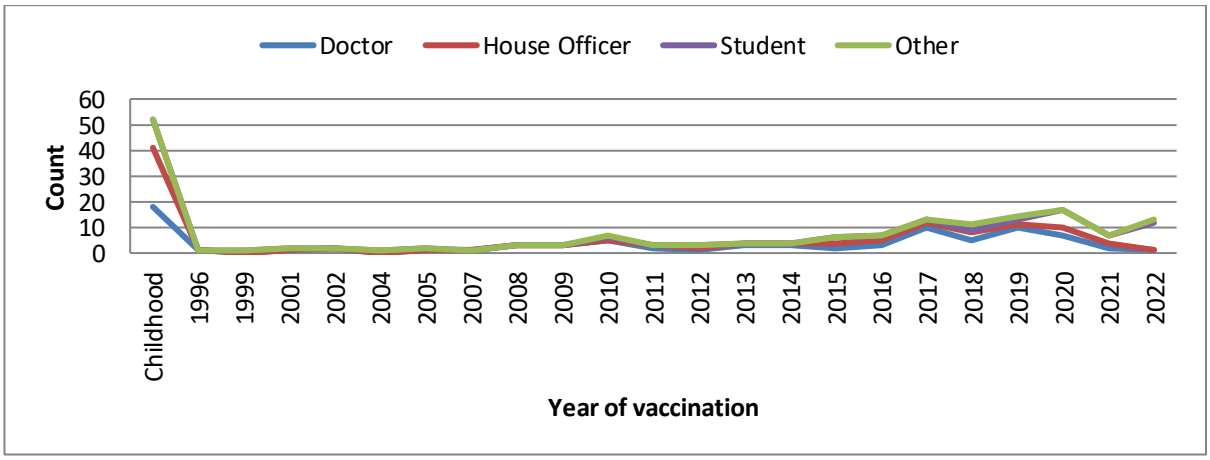
Table no 1 shows 177 (59.6%) responders were vaccinated against Hepatitis B and only 51% responders received their booster dose.

There is a significant difference in vaccination status with highest frequency seen in doctors (28.3%) and least in the other HCW staff also owing to lack of responses from that group. Same was observed for the booster doses with 29% doctors.

			Vaccination Status			**Booster/Re-immunization status**		
			Vaccinated	**Non-vaccinated**	**Unclear status**	**Boostered**	**Non-boostered**	**Unclear status**
Designation	**Doctor**	Count	84	14	12	29	73	8
		% of Total	28.30%	4.70%	4.00%	9.80%	24.60%	2.70%
	House Officer	Count	42	10	4	12	42	2
		% of Total	14.10%	3.40%	1.30%	4.00%	14.10%	0.70%
	Student	Count	46	39	37	9	78	35
		% of Total	15.50%	13.10%	12.50%	3.00%	26.30%	11.80%
	Other	Count	5	3	1	1	8	0
		% of Total	1.70%	1.00%	0.30%	0.30%	2.70%	0.00%
Total		Count	177	66	54	51	201	45
		% of Total	59.60%	22.20%	18.20%	17.20%	67.70%	15.20%

Figure 1: Annual frequency of Hepatitis B vaccination over the years.

The year of vaccination against Hep B is depicted in Figure:1 shown above, in which the largest spike is seen in childhood followed by the year 2020 (During height of Covid-19 pandemic).



Reasons for non-vaccination are shown in Table no: 2 below,

Table 2: Reasons for non-vaccination.

			Designation				Total
			Doctor	House Officer	Student	Other	
Reason for non-vaccination	Non-responders	Count	96	46	83	6	231
		% of Total	32.3%	15.5%	27.9%	2.0%	77.8%
	Unnecessary	Count	3	0	1	0	4
		% of Total	1.0%	0.0%	0.3%	0.0%	1.3%
	Had no awareness	Count	1	1	8	0	10
		% of Total	0.3%	0.3%	2.7%	0.0%	3.4%
	Didn't think you were at risk	Count	4	5	18	2	29
		% of Total	1.3%	1.7%	6.1%	0.7%	9.8%
	Never had the time	Count	4	4	10	1	19
		% of Total	1.3%	1.3%	3.4%	0.3%	6.4%
	Cost	Count	1	0	1	0	2
		% of Total	0.3%	0.0%	0.3%	0.0%	0.7%
	Fear	Count	1	0	1	0	2
		% of Total	0.3%	0.0%	0.3%	0.0%	0.7%
Total		Count	110	56	122	9	297
		% of Total	37.0%	18.9%	41.1%	3.0%	100.0%

Table 3: Prevalence of Hep B in different areas of Pakistan.

Population Type	Year	Region	Population Sample	HBV %
General Population	2009	Lahore	992	8.06
	2008	Karachi	3820	4.50
	2007	Islamabad	1300	4
	2015	Islamabad	345	9
Recruitments	2008	Interior Sindh	5237	7.39

Prisoners	2012	Punjab	2287	3.5
	2010	Karachi	365	5.90
Healthcare Personnel	2002	Muzaffarabad	199	4.10
	2012	Punjab	1051	1
Pregnant Women	2009	Karachi	2592	0.34
	2006	Hyderabad	103	12.60
Blood Donors	2017	Lahore	18,274	1.1
	2014	Islamabad	160,376	2.35
	2006	Karachi	7325	4.7
IDU	2017	Lahore	100	6
	2007	Karachi	161	7.50

Several different studies reported the prevalence of HBV infections in Pakistani population varying in different regions and groups, which is depicted in Table no.3.

The most common reason for being non-vaccinated by responders was "they didn't think that they were at risk"(9.8%) and mostly this answer was given by students (6.1%).

Contrasting results for booster dose showed the most common reason for skipping booster dose was due to non-vaccination (21.5%) mainly from students (12.8%) with second most common reason being unawareness mostly given by doctors (9.1%) and students (6.7%).

During research, it was found that majority of the responders (78.8%) haven't got their titers checked and only (21.2%) responders had been tested and also the largest spike of titer test was in 2020 aligning with findings that indicated many had received Hep B vaccination during the same year. This overlap suggests heightened awareness and measures during Covid-19 pandemic.

It was also noted that (74.1%) responders were unaware of what an antibody titer test meant.

Even so half (51.1%) of the target group believe that they are not at risk of Hepatitis B and (68.4%) responders cite this belief for their family members.

Discussion:

Hepatitis B, being a blood borne disease, represents a significant occupational risk among healthcare workers (HCW's). The frequency of infection in HCW's is up to 4-times greater than in individuals who do not work in hospitals. That is why the need for vaccination against HBV is imperative and should be prioritized. HBV vaccination with 95% sero-conversion rates, is highly successful. Approximately 3 million HCWs each year have occupational risk and exposure to HBV infection among the 35 million HCWs working globally, leading to 66 thousand HBV infections and 261 deaths (7). Hepatitis b vaccination remains a cost-effective population wide intervention to achieve national and global elimination of this disease. The goal is to prevent its transmission and occurrence that ultimately leads to long-term reduction of mortality. However, as chronic Hepatitis B infection advances slowly to cirrhosis or liver cancer, relying solely on Hepatitis B vaccine to minimize HBV-related morbidity and mortality could take decades (8).

The prevalence of HBV ranges from 2.5-10% and the prevalence of HBsAG positivity reported among Pakistani HCW's is 4.7%. Owing to the fact that majority of cases go unnoticed and unreported (9).

Our study revealed that 59.6% of HCW's and students were vaccinated against Hep b, similar findings (64%) were reported in 2007 by S Memon et al, which include HCW's of two university hospitals (Lumhs and Isra university) in Hyderabad so both these studies suggest the constant rate of vaccination among HCW's (10,11).

Vaccination coverage in HCW's in developed countries was notably high such as Italy (96.3%),Switzerland (94.7%), china (86.4%) and so on, because their vaccination policies for medical, nursing and other paramedical staff make it a part of necessary requisites and many countries even exercise mandatory vaccination policy penalties to deter non-compliance including countries within Europe, Africa and United states of America (12). In developing countries, the vaccination coverage has remained perpetually lower throughout several decades. While in Pakistan there is no medical insurance or mandated policy to assure that HCW's vaccinate along with the fact that many hospitals refuse to bear the cost of vaccination (13).

In our analysis, there were significant variations in the immunization rates across different working groups, the highest coverage was seen in doctors (28.3%) while lowest coverage in other HCW's (1.7%). The most common reason for non-vaccination quoted by students in this study was "they didn't think that they were at risk"(9.8%), similar results were also obtained from a report, which compares the knowledge and attitude regarding HBV among healthcare professionals in CMH and LMC, in which >50% of the students had received HBV vaccination, but it was discovered that most students lacked sufficient knowledge (14). Other similar studies showed low vaccination rates among clinical groups and even lower in non-clinical groups (15) (16). Even though ACIP recommends, before beginning direct patient care, medical students should be urged to get vaccinated against HBV specially as clinical staff is at an increased risk of infection (17).

According to the CDC, the vaccine efficacy study demonstrated virtually complete protection against HBV in immunocompetent individuals, with post immunization anti-HBS level >10mlU/ml, which in fact, is the level of sero-protection (18). As it stands, In case of HBV the presence of antibodies, particularly anti-HBs, is connected to protection against HBV and and immune memory which persists even after the anti-HBS antibodies fade away is tied to protection against disease (such as persistent viremia, carrier-ship, acute Hepatitis (etc.) (19) . The evidence of duration of immunity after the completion of primary vaccination has increased as pointed by the WHO, suggestion that all countries should implement universal HBV vaccination by 1997 and the latest WHO estimates the proportion of chronically HBV infected children under five years of age dropped from 5% to just under 1% in 2019 in the pre-vaccine era (20).

Based on current scientific evidence, booster vaccination against HBV is not required in immunocompetent and fully immunized individuals as no difference in anti-HBS was noted afterwards, but immunocompromised patients and HCW's after accidental exposure should be monitored and should receive a booster dose if their anti-HBS decreases below 10mlU/mL (21) (22).

A realistic approach in estimating duration of protection provided by HBV vaccine is the antibody titer test and it also sets the precedent for re-vaccination and in our study we found that the majority of the responders (78.8%) have never got their antibody titers checked. With regards to re-vaccination (booster dose), (17.2%) responders in this study got their booster dose. However, without antibody titer test, HBV revaccination is inefficient; none of the international guidelines support this practice (23).

There was no published research report found similar to the mentioned data (Booster dose status and titer awareness) in our country that discusses the rate at which individuals get revaccinated, hence no comparison could be made (24).

With At least 3% chronic HBV carriers in Pakistan, which is highly endemic (9 million infected nationwide), the disease transmission rate is also increasing day to passing day (Tawab H & Khalil T, 2021). It may be due to lack of knowledge regarding pathways of transmission and a huge number of HBV-infected people infecting healthy individuals (25).

Short Comings in this study were that the Clarity about no of Hep B vaccination doses among HCWs was not assessed. Also, no questions were raised regarding the routes of transmission to assess the knowledge about the dynamic spread of this disease especially among students and paramedical staff (26).

Conclusion:

The vaccination status in our study group was satisfactory among the doctors but medical students and paramedical staff require an integrated education system and awareness program before they get involved in direct and indirect patient care.

Government should scale-up screening care and treatment service in our Country and hospitals should be provided health equities within the Hepatitis response.

We believe that the hospitals must provide the vaccination as well as the regular antibody titer test and as it was noted in our study that antibody titer test is neglected by health-care workers, and there is an urgent need of awareness programs and researches to formulate evidence based policy and data to determine the vaccine efficacy, duration along with need for booster dose. HCWs as well as General population need to be educated to improve precautionary measures taken on a day to day basis.

Lastly, new researches and surveys like this one need to be conducted Province to Province in Pakistan to properly assess the actual prevalence and vaccination status among HCWs as well as common public and to create a basis for new guidelines to be introduced.

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Dr. Shifa Baloch: Data collection and data analysis
Dr. Ali Raza: Organization of data and review of complete text
Dr. Salman Shafique: Concept design, critical review of data and supervision
Dr. Alvina Shaikh: Drafting the manuscript
Dr. Tariq Hussain Shaikh: co-supervision and interpretation of data
Dr. Rafay khan: Data collection and organization