

Knowledge, Attitudes, and Practices About Hepatitis B Among Medical and Dental Students of Karachi

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Abstract

Objective: The objective of the study was to assess the knowledge, attitude, and practices (KAP) about Hepatitis B virus (HBV) among the students of medical and dental colleges of Karachi. **Methodology:** The cross-sectional study was conducted in five medical and dental colleges of Karachi. Students of the 3rd, 4th, and final year were invited to join the study. The questionnaire included sociodemographic information followed by three sections evaluating the knowledge, attitudes, and practices regarding HBV. Twenty-nine questions were related to knowledge, 11 for attitude, and 4 for practices. Pearson's Chi-square test/Fisher's Exact test and Spearman correlation were utilized to find the association and correlation of knowledge, attitudes, and practices with independent variables. **Results:** Three hundred and seventy-nine students participated in the study. Two hundred and nine of them (78.9%) were females and 253 (66.8%) students were medical students. Ninety-five percent of the students correctly responded of the causative organism of HBV. Knowledge of MBBS and BDS students for transmission of HBV were significantly different for the questions: "mother to child," coughing and sneezing' and "kissing." Almost all the responses regarding complications due to HBV (respiratory failure, stroke, congestive heart failure liver, cirrhosis, colorectal cancer, and spine and bone fracture) received more than 90% of correct answers. In response to contraindication factors for HBV, only "extreme of ages" showed a significant difference between the genders. The percentage of poor, moderate, and good knowledge were 17.4%, 53%, and 29.6% respectively. About 60% of students indicated that they have gone through screening for HBV. About 20% of students indicated that they had experience of needle injury and only 43% of them taken postexposure prophylactic measures. **Conclusion:** Study revealed that the KAP of medical and dental students of Karachi are satisfactory and have been improved. However, few elements need to be focused in curricula and workshops for further improvement.

Keywords: Hep B virus, knowledge, attitude and practices study, Karachi, students of medicine and dentistry

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INTRODUCTION

Hepatitis B infection, produced by Hepatitis B virus (HBV) is rapidly growing and shows high mortality and morbidity worldwide.^[1,2] HBV is double-standard DNA virus that belongs to the group of *Hepadnaviridae* family.^[2] Many liver diseases are caused by HBV; such as acute hepatitis, chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma.^[3] World Health Organization (WHO) reported in 2015 that about 257 million people were probability affected by Hepatitis B infection and about 887,000 have died due to complications of cirrhosis and hepatocellular carcinoma.^[4] In an another report WHO indicated that in Pakistan the patients suffering from Hepatitis B and Hepatitis C in mid-2019 were 5 million and 10 million, respectively.^[5] The prevalence rate of HBV has been stated 3%–5% in Pakistan while this rate exceeds to about 10%–20% in high-risk group.^[6] Common routes of transmission for HBV are blood transfusion and blood products, contaminated injection needles, piercing or tattooing, sexual transmission, and vertical transmission from mother to child.^[7] Medical personnel are involved in many of the above mentions healthcare activities, hence are in a higher risk of becoming contaminated.^[2] Trainees, especially the medical students are in much higher risk of acquiring this infection due to their lesser training or plain carelessness during those medical procedures.^[8]

Many studies have been conducted on medical,^[1,2,7-14] dental^[3,15-19] and both medical and dental students^[20-22] to determine the knowledge, attitude, and practices (KAP) for HBV. However, in Pakistan, most of the studies were conducted either in private medical colleges or only on one institution, except the studies of Khan *et al.*^[1,7] or Ali *et al.*^[8] Khan *et al.* have published two studies on the data collected in 2007 and Ali did not elaborate the type of institutions. In the last 12 years, since Khan has collected those data, the system of education has been changed from annual system to a modular system and hence curriculum of medical education has been modified drastically. In the annual system, the students were taught during the first 2 years the basic medical sciences, e.g., Biochemistry, Physiology, etc., semester-wise. However, the modular system, they are taught the system, e.g., digesting

system, nervous system, etc., in certain weeks, and the basic medical sciences needed for the respective systems were included in the teaching. These changes in the curriculum have impacted tremendously in the medical education. Therefore, the KAP regarding HBV management could be altered. Hence, this study was conducted in medical and dental colleges of Karachi with the objective to assess the current KAP about HBV among the students of medical and dental colleges of Karachi.

METHODOLOGY

The cross-sectional study was conducted at five medical and dental colleges of Karachi, namely: Sindh Medical College, Sindh Institute of Oral Health Sciences, Fatima Jinnah Dental College, Liaquat College of Medicine and Dentistry, and Sir Syed College of Medical Sciences for Girls. The first two of them were public institutions and the rest were private colleges. Permission from the administration of each selected institution was obtained before the actual survey. The study was approved by the Institutional Review Board of Jinnah Sindh Medical University Ref: JSMU/IRB/2019-190.

The total number of students of the aforementioned medical colleges was about 2800 in 3rd, 4th and final year in 2019. The frequency of excellent knowledge of Hepatitis B among medical students of Karachi was 57.5% as indicated by Khan *et al.*^[1] Using the above two information with 95% confidence interval and $\pm 5\%$ error in estimate the required sample size was computed as 332 using open EPI Calculator. The sampling technique was nonprobability convenience sampling. Students of 3rd year, 4th year, and final year were approached in their free time in classrooms or corridor and invited to join the study as participant. The objective of the study was explained to each participant and invited to join the study. A written informed consent was taken before asking to fill the questionnaire. Students who did not give consent or those who belonged to 1st or 2nd year were excluded from the study. The questionnaire was designed by the investigators, using the literature. Face validation was carried out by the experts and further validation was done by a pilot study of about 20 respondents. Researchers were present for any kind of assistance

in filling the questionnaire and they collected the forms on the same day. The questionnaire included sociodemographic information about name, age, gender, year of study, and institute, followed by three sections evaluating the knowledge, attitudes, and practices regarding HBV. Knowledge questions were about the route of transmission (Mother to child, Sexual contact, Blood to blood, sharing needles, syringes, etc., sharing shaving kit, contact with open wounds, sharing clothes, utensils, coughing, sneezing, kissing, drinking tap water, eating unhygienic food, mosquitoes), main organ affected, complications (respiratory failure, stroke, congestive heart failure, liver cirrhosis, colorectal cancer, spine and bone fracture), curability of the HBV, contraindications of HBV (pregnancy, breastfeeding, extremes of ages, pubertal teenagers, immunocompromised, severe allergy from vaccine component, Guillain–Barre syndrome, high-grade fever). The attitude questions were, Concerns regarding vaccination (Ineffectiveness, Side effects, Improper injection technique, Procrastination, Lack of awareness, No concerns), Vaccine significance (Self-protection, Patient safety, Break transmission chain), and ‘should HBV vaccination be mandatory for all medical/dental students. The practice questions were screening of HBV, vaccination doses, experience of needle-stick injury and postexposure prophylactic measure.

Twenty-nine questions were related to knowledge, 11 for attitude, and 4 for practices. Knowledge questions were categorized into poor, moderate, and good knowledge as 0–20 = poor, 21–25 = moderate, and 26–29 = good. The duration of the study was from June 2019 to August 2019.

Data entry and analysis were carried out using SPSS Version 23.0. Incomplete filled forms were excluded from the study. Pearson’s Chi-square test was utilized to find the association of knowledge, attitudes, and practices with independent variables i.e., gender, pursuing degree, year of education and institute. Fisher’s exact test was used where the Chi-square test was not valid. Spearman correlation was used to determine the correlation between knowledge and practices. $P < 0.05$ was kept as the level of significance. Since the ‘professional year of study has 3 categories 3rd, 4th, and 5th years and if the

Chi-square is not valid due to smaller frequencies in more than 20% of cells, then Fisher Exact test can also not be calculated, and therefore P value calculated by Chi-square may not be valid, as it is indicated in few cases in the tables.

RESULTS

Three hundred and seventy-nine students participated in the study. Two hundred ninety-nine of them (78.9%) were females and 253 (66.8%) students were enrolled in medical colleges. About half of the respondents (48.8%) were the students of 3rd professional year. About two-third of the students ($n = 245$; 64.6%) were registered in government institutions and 202 of them were from Sindh Medical College. The average age of the students was 21.73 ± 1.14 years (R: 18–25 years). There was no significant difference of between male and female students’ mean age (Female: 21.66 ± 1.12 years; Male: 22.02 ± 1.12 years) and between MBBS and BDS students (MBBS: 21.84 ± 1.16 years; BDS: 21.52 ± 1.06 years).

Tables 1 and 2 show the knowledge of the students regarding HBV, categorized by gender (male/female), type of pursuing degree (MBBS/BDS), type of institution (government/private), and professional year of studies (3rd, 4th, and 5th year). In response to the causative organism of HBV, more than 95% of the students responded correctly that it is due to “virus.” None of the independent variable showed any significant difference between factors associated with respective variables ($P > 0.05$). However, female students showed marginally better knowledge than male students. Twelve questions were asked for transmission of HBV. The first six options were the “correct” causes and the last six were the “wrong” causes. Numbers mentioned in the tables indicate the percentages of the “correct” answers. Most of the percentages of the knowledge of major possible routes of transmission of HBV between male and female students were insignificant, except “sharing shaving kits” and “kissing.” Male students showed significantly better knowledge ($P = 0.016$) than female students for “sharing shaving kits” (67.5% vs. 57.5%), while female students indicated a significantly higher percentage of correct answers in case of “kissing” ($P = 0.014$)

than male students (87.3% vs. 76.3%). Knowledge of MBBS and BDS students for transmission of HBV were significantly different for the questions: “mother to child”, “coughing and sneezing” and “kissing.” In all the three items, MBBS students showed significantly better knowledge than BDS students ($P < 0.05$) [Table 1]. The students of government institutions showed significantly improved knowledge to the students of private

institutes for the transmission of HBV through “blood to blood”, “sharing needles, syringes etc.”, and “kissing” ($P < 0.05$). The lowest percentage among the possible 12 routes of transmission marked in the questionnaire was “contact with the open wounds” (53.6%), while “mosquitoes” received the highest percentage of 98.4% for the correct responses. The options of “Mother to child,” “Blood to blood,” “Sharing needles,

Table 1: Knowledge of hepatitis B with respect to gender and pursuing degree

Question	Gender			Pursuing Degree		
	Female	Male	P	MBBS	BDS	P
Cause of hepatitis B	288 (98.6)	74 (92.5)	0.394*	241 (95.3)	121 (96.0)	0.910*
Transmission of HBV						
Mother to child	222 (74.2)	59 (73.8)	0.928	200 (79.1)	81 (64.3)	0.002
Sexual contact	240 (80.3)	68 (85.0)	0.335	211 (83.4)	97 (77.0)	0.132
Blood to blood	251 (83.9)	65 (81.3)	0.565	211 (83.4)	105 (83.3)	0.987
Sharing needles, syringes etc.	236 (78.9)	63 (78.8)	0.871*	202 (79.8)	97 (77.0)	0.322*
Sharing shaving kit	172 (57.5)	54 (67.5)	0.016	153 (60.5)	73 (57.9)	0.635
Contact with open wounds	157 (52.5)	46 (57.5)	0.427	141 (55.7)	62 (49.2)	0.230
Sharing clothes, utensils	279 (93.3)	74 (92.5)	0.799	239 (94.5)	114 (90.5)	0.148
Coughing, sneezing	261 (87.3)	71 (88.8)	0.725	233 (92.1)	99 (78.6)	<0.001*
Kissing	261 (87.3)	61 (76.3)	0.014	222 (87.7)	100 (74.9)	0.032
Drinking tap water	289 (96.7)	75 (93.8)	0.236*	245 (96.8)	119 (94.4)	0.260*
Eating unhygienic food	285 (95.3)	75 (93.8)	0.568*	243 (96.0)	117 (92.9)	0.180
Mosquitoes	296 (99.0)	77 (96.3)	0.080*	249 (98.4)	124 (98.4)	0.996*
Main organ system affected by hepatitis B	267 (89.3)	78 (97.5)	0.410*	233 (92.1)	112 (88.9)	0.043*
Complications of hepatitis B						
Respiratory failure	282 (94.3)	75 (93.8)	0.848*	242 (95.7)	115 (91.3)	0.086
Stroke	289 (96.7)	80 (100)	0.097*	247 (97.6)	112 (96.8)	0.646*
Congestive heart failure	276 (92.3)	71 (88.8)	0.309	228 (90.1)	119 (94.4)	0.154
Liver cirrhosis	271 (90.6)	72 (90.0)	0.863	232 (91.7)	111 (88.1)	0.260
Colorectal cancer	288 (96.3)	80 (100)	0.082*	246 (97.2)	122 (96.8)	0.824*
Spine and bone fracture	298 (99.7)	78 (97.5)	0.052*	251 (99.2)	125 (99.2)	0.997*
Hepatitis B is						
Completely curable	60 (20.1)	27 (33.8)	0.016	70 (27.7)	17 (13.5)	0.002
Curable up to certain level	181 (60.5)	43 (53.8)		145 (57.3)	79 (62.7)	
Not curable	50 (16.7)	6 (7.5)		34 (13.4)	22 (17.5)	
Don't know	8 (2.7)	4 (5.0)		4 (1.6)	8 (6.3)	
Hepatitis B is vaccine preventable disease	276 (92.3)	76 (95.0)	0.634*	236 (93.3)	116 (92.1)	0.882
Contraindications of Hepatitis B vaccine						
Pregnancy	195 (65.2)	50 (62.5)	0.652	172 (68.0)	73 (57.9)	0.054
Breastfeeding	219 (73.2)	65 (81.3)	0.142	197 (77.9)	87 (69.0)	0.062
Extremes of ages	281 (94.0)	67 (83.8)	0.003	237 (93.7)	111 (88.1)	0.062
Pubertal teenagers	297 (99.3)	79 (98.8)	0.510*	252 (99.6)	124 (98.6)	0.217*
Immunocompromised	179 (59.9)	52 (65.0)	0.403	144 (56.9)	87 (69.0)	0.023
Severe allergy from vaccine component	149 (49.8)	33 (41.3)	0.172	128 (50.6)	54 (42.9)	0.156
Guillain-Barre syndrome	281 (94.0)	80 (100)	0.018	244 (96.4)	117 (92.9)	0.122
High grade fever	37 (12.4)	6 (7.5)	0.222	32 (12.6)	11 (8.7)	0.257
Combined knowledge						
≤20	53 (17.7)	13 (16.2)	0.339	38 (15.0)	28 (22.2)	0.098
21-25	153 (51.2)	48 (60.0)		133 (52.6)	68 (54.0)	
26-29	93 (31.1)	19 (23.8)		82 (32.4)	30 (23.8)	

*Fisher's exact test was applied. HBV: Hepatitis B virus

syringes etc.,” and “Sharing saving kits” showed significant improvements by the professional year of education ($P < 0.05$) [Table 2].

No significant difference was observed between male and female students regarding the correct answer of main organ affected due to HBV ($P > 0.05$). However, MBBS students showed significantly better knowledge ($P = 0.043$) as compared to BDS

students (92.1% vs. 88, 9%) [Table 1]. Students of government institutes showed better knowledge for this investigation ($P = 0.002$) than private institutes (94.3% vs. 85.1%). Furthermore, the knowledge about this questions has been improved with progress of education year ($P = 0.018$) [Table 2].

In the list of complication due to HBV, only “liver cirrhosis” was the correct answer. Almost

Table 2: Knowledge of hepatitis B with respect institution and year of education

Question	Institute			Professional year of education				Total
	Government	Private	P	3 rd year	4 th year	5 th year	P	
Cause of hepatitis B	234 (95.5)	128 (95.5)	0.582*	87 (95.6)	75 (94.9)	79 (95.2)	0.910**	362 (95.5)
Transmission of HBV								
Mother to child	189 (77.1)	92 (68.7)	0.071	63 (69.2)	62 (78.5)	75 (90.4)	0.003	281 (74.1)
Sexual contact	201 (82.0)	107 (79.9)	0.601	77 (84.6)	62 (78.5)	72 (86.7)	0.341	308 (81.3)
Blood to blood	212 (86.5)	104 (77.6)	0.026	66 (72.5)	69 (87.3)	76 (91.6)	0.002	316 (83.4)
Sharing needles, syringes etc.	202 (82.4)	97 (72.4)	0.038*	63 (69.2)	62 (78.5)	77 (92.8)	0.001	299 (78.9)
Sharing shaving kit	152 (62.0)	74 (55.2)	0.196	43 (47.3)	41 (51.9)	69 (83.1)	<0.001	226 (59.6)
Contact with open wounds	138 (56.3)	65 (48.5)	0.145	48 (52.7)	44 (55.7)	49 (59.0)	0.706	203 (53.6)
Sharing clothes, utensils	231 (94.3)	122 (91.0)	0.233	88 (96.7)	75 (94.9)	76 (91.6)	0.326**	353 (93.1)
Coughing, sneezing	219 (89.4)	113 (83.7)	0.153	82 (90.1)	72 (91.1)	79 (95.2)	0.432	332 (87.6)
Kissing	217 (88.6)	105 (78.4)	0.008	79 (86.8)	72 (91.1)	71 (85.5)	0.523	322 (85.0)
Drinking tap water	238 (97.1)	126 (94.0)	0.137	88 (96.7)	76 (96.2)	81 (97.6)	0.877	364 (96.0)
Eating unhygienic food	233 (95.1)	127 (94.8)	0.889	86 (94.5)	76 (96.2)	81 (97.6)	0.578	360 (95.0)
Mosquitoes	240 (98.0)	133 (99.3)	0.334*	91 (100)	77 (97.5)	81 (97.6)	0.319**	373 (98.4)
Main organ system affected by hepatitis B	231 (94.3)	114 (85.1)	0.002*	78 (85.7)	75 (94.9)	80 (96.4)	0.018	345 (91.0)
Complications of hepatitis B								
Respiratory failure	235 (95.9)	122 (91.0)	0.052	82 (90.1)	78 (98.7)	82 (98.8)	0.005**	357 (94.2)
Stroke	240 (98.0)	129 (96.3)	0.326*	86 (94.5)	78 (98.7)	83 (100)	0.044**	369 (97.4)
Congestive heart failure	226 (92.2)	121 (90.3)	0.515	82 (90.1)	72 (91.1)	74 (89.2)	0.915	347 (91.6)
Liver cirrhosis	233 (95.1)	110 (82.1)	<0.001	77 (84.6)	75 (94.9)	80 (96.4)	0.009	343 (90.5)
Colorectal cancer	238 (97.1)	30 (97.0)	0.934*	88 (96.7)	75 (94.9)	83 (100)	0.135**	368 (97.1)
Spine and bone fracture	243 (99.2)	133 (99.3)	0.941*	8 (97.8)	79 (100)	83 (100)	0.166**	376 (99.2)
Hepatitis B is								
Completely curable	64 (26.1)	23 (17.2)	0.001	21 (23.1)	25 (31.6)	24 (28.9)	0.069**	87 (23.0)
Curable up to certain level	131 (53.5)	93 (69.4)		62 (68.1)	43 (54.4)	40 (48.2)		224 (59.1)
Not curable	45 (18.4)	11 (8.2)		7 (7.7)	9 (11.4)	18 (21.7)		56 (14.8)
Don't know	5 (2.0)	7 (5.2)		1 (1.1)	2 (2.5)	1 (1.2)		12 (3.2)
Hepatitis B is vaccine preventable disease	232 (94.7)	120 (89.6)	0.109	85 (93.4)	73 (92.4)	78 (94.0)	0.922	352 (92.9)
Contraindications of hepatitis B vaccine								
Pregnancy	153 (62.4)	92 (68.7)	0.227	64 (70.3)	48 (60.8)	60 (72.3)	0.243	245 (64.6)
Breastfeeding	180 (73.5)	104 (77.6)	0.374	70 (76.9)	58 (73.4)	69 (83.1)	0.318	284 (74.9)
Extremes of ages	224 (91.4)	124 (92.5)	0.707	84 (92.3)	72 (91.1)	81 (97.6)	0.193	348 (91.8)
Pubertal teenagers	244 (99.6)	132 (98.5)	0.255	90 (98.9)	79 (100)	83 (100)	0.409	376 (99.2)
Immunocompromised	147 (60.0)	4 (62.7)	0.608	50 (54.9)	39 (49.4)	55 (66.3)	0.085	231 (60.9)
Severe allergy from vaccine component	121 (49.4)	61 (45.5)	0.471	31 (34.1)	47 (59.5)	50 (60.2)	<0.001	182 (48.0)
Guillain-Barre Syndrome	237 (96.7)	124 (92.5)	0.066	86 (94.5)	75 (94.9)	83 (100)	0.101**	361 (95.3)
High grade fever	37 (15.1)	6 (8.5)	0.002	6 (6.6)	8 (10.1)	18 (21.7)	0.008	43 (11.3)
Combined knowledge								
≤20	35 (14.3)	31 (23.1)	0.046	19 (20.9)	14 (17.7)	5 (6.0)	0.003	91 (17.4)
21-25	130 (53.1)	71 (53.0)		50 (54.9)	44 (55.7)	39 (47.0)		79 (53.0)
26-29	80 (32.7)	32 (23.9)		22 (24.2)	21 (26.6)	39 (47.0)		83 (29.6)

*Fisher's exact test was applied, **Due to low cell frequency, Chi-square may not be a valid test. HBV: Hepatitis B virus

all the responses regarding complications due to HBV (respiratory failure, stroke, congestive heart failure liver, cirrhosis, colorectal cancer, and spine and bone fracture) received more than 90% of correct answers. Neither gender (male/female) nor pursuing degree (MBBS/BDS) showed any statistical significant difference in any of these complications ($P > 0.05$) [Table 1]. Students of government medical colleges picked up the correct answer of “liver cirrhosis” significantly higher than private college students ($P < 0.001$). As the medical year of education increased, it gave significantly better response for “Respiratory failure,” “Stroke” and “Liver cirrhosis” ($P < 0.05$) [Table 2].

To know the knowledge of curability of HBV, female students showed significantly better knowledge of “curable up to certain level” as compared to male students (60.5% vs. 53.8%) ($P = 0.016$). Surprisingly, BDS students indicated significantly better knowledge regarding this question ($P = 0.002$) than MBBS students (62.7% vs. 57.3%) [Table 1]. Students of the private medical colleges showed significantly superior knowledge than students of public institutions (69, 4% vs. 53.5; $P = 0.001$). Ninety-three percent of the students agreed that Hep B vaccine prevents the disease. There was no significant difference among gender or discipline or type of institutions or year of medical education. In response of contraindication factors for HBV, only “extreme of ages” showed significant difference between the genders ($P = 0.003$). Female students indicated better knowledge than male students (94% vs. 83.3%). Regarding pursuing degree only “immunocompromised patients” showed significant difference ($P = 0.023$). Surprisingly, BDS students showed enhanced knowledge than MBBS students (69.0% vs. 56.9%) [Table 1]. “High grade fever” showed significant difference among government and private institutions ($P = 0.002$). “Severe allergy from vaccine component” showed better response as year of education increased [Table 2]. The percentage of poor, moderate and good knowledge of the total respondents, according to the categorizations stated in “Methodology” section were 17.4%, 53% and 29.6% for respectively. There was no significant difference among the gender (female/male) and pursuing degree (MBBS/BDS). However, female

and MBBS students showed improved knowledge as compared to male and BDS students, respectively. The students of government colleges and 5th year students showed significantly enhanced knowledge as compared to the students of private colleges and junior classes. The combined knowledge of government institutes’ and 5th year students showed significantly higher as compared to private institutes and lower class students ($P = 0.046$ and $P = 0.003$, respectively).

Attitude of the students regarding Hep B is shown in Tables 3 and 4. In responding to the question that what was the concern for not vaccinating for HBV, about one-third (31.1%) indicated that it was due to the improper injection technique. However, there was no significant difference between male and female students for any of the penciled options. Nevertheless, about 70% showed some concern for not vaccinating. Comparing discipline (MBBS/BDS), BDS students indicated significantly more concern regarding the ineffectiveness of the vaccine ($P < 0.0001$). However about 80% of BDS students showed some concerns for HBV vaccination, and it was significantly higher than MBBS students ($P = 0.001$) [Table 3]. Students of private colleges showed more concerns of “side effects” and “improper injection techniques” as compared to government colleges ($P = 0.002$, $P = 0.017$, respectively) for not going for vaccination. Furthermore, about 85% of private colleges’ students showed some concerns as compared to government colleges students’ response of 61% ($P < 0.0001$). Year of medical education showed positive correlation with professional year and concern about the vaccination (0.032) [Table 4]. This table also discusses the significance of vaccine for HBV. No statistical significant difference were observed in responses of self-protection and patient-safety for both gender and pursuing degree. However, BDS students showed significantly enhanced knowledge in response that HBV vaccine “break transmission chain” ($P < 0.0001$). Furthermore, students of private colleges showed better knowledge of vaccine significance regarding “patient safety” ($P = 0.035$). As the teaching years increased, significantly better knowledge were seen in “self-protection; and ‘break transmission chain.’” Almost all the respondents were in the opinion that HBV vaccination should be mandatory for all medical and dental students and there were no

Table 3: Attitude about vaccination with respect to gender and pursuing degree

Question	Gender			Pursuing degree		
	Female	Male	P	MBBS	BDS	P
Concerns regarding vaccination						
Ineffectiveness	14 (4.7)	7 (8.8)	0.158*	5 (2.0)	16 (12.7)	<0.0001
Side effects	43 (14.4)	11 (13.8)	0.886	35 (13.8)	19 (13.8)	0.744
Improper injection technique	96 (32.1)	22 (27.5)	0.429	74 (29.2)	44 (34.9)	0.261
Procrastination	34 (11.4)	11 (13.8)	0.559	31 (12.3)	14 (11.1)	0.746
Lack of awareness	20 (6.7)	4 (5.0)	0.582	16 (6.3)	8 (6.3)	0.998
Other	24 (8.0)	3 (3.8)	0.187	19 (7.5)	8 (7.5)	0.679
No concerns	86 (28.8)	30 (37.5)	0.132	91 (36.0)	25 (19.8)	0.001
Vaccine significance						
Self-protection	289 (96.7)	74 (92.5)	0.101	240 (94.9)	123 (97.6)	0.209
Patient safety	155 (51.8)	35 (43.8)	0.199	123 (48.6)	67 (53.2)	0.403
Break transmission chain	35 (11.7)	16 (20.0)	0.053	45 (17.8)	6 (4.8)	<0.0001
Hepatitis B vaccination should be mandatory for medical and dental students	289 (96.7)	74 (92.5)	0.070	245 (96.8)	118 (93.7)	0.334*

*Fisher's exact test was applied

Table 4: Attitude about vaccination with respect to institute and year of education

Question	Institute			Year of education				Total
	Government	Private	P	3 rd year	4 th year	5 th year	P	
Concerns regarding vaccination								
Ineffectiveness	11 (4.5)	10 (7.5)	0.226	2 (2.2)	2 (2.5)	1 (1.2)	0.817**	21 (5.5)
Side effects	25 (10.2)	29 (21.6)	0.002	14 (15.4)	12 (15.2)	9 (10.8)	0.629	54 (14.2)
Improper injection technique	66 (26.9)	52 (38.8)	0.017	34 (37.4)	20 (25.3)	20 (24.1)	0.103	118 (31.1)
Procrastination	35 (14.3)	10 (7.5)	0.050	11 (12.1)	15 (19.0)	5 (6.0)	0.042	45 (11.9)
Lack of awareness	16 (6.5)	8 (6.0)	0.830	10 (11.0)	3 (3.8)	3 (3.6)	0.073	24 (6.3)
Other	18 (7.3)	9 (6.7)	0.820	3 (3.3)	6 (7.6)	10 (12.0)	0.091	27 (7.1)
No concerns	95 (38.8)	21 (15.7)	<0.0001	26 (28.6)	26 (32.9)	39 (47.0)	0.032	116 (30.6)
Vaccine significance								
Self-protection	237 (96.7)	126 (94.0)	0.211	81 (89.0)	77 (97.5)	82 (98.8)	0.006**	363 (95.8)
Patient safety	113 (46.1)	77 (57.5)	0.035	39 (42.9)	39 (49.4)	45 (54.2)	0.322	190 (50.1)
Break transmission chain	44 (18.0)	7 (5.2)	0.001	23 (25.3)	7 (8.9)	15 (18.1)	0.020	51 (13.5)
Hepatitis B vaccination should be mandatory for medical and dental students	237 (96.7)	126 (94.0)	0.254*	86 (94.5)	77 (97.5)	82 (98.8)	0.252**	363 (95.8)

*Fisher's exact test was applied, **Due to low cell frequency, Chi-square may not be a valid test

significant difference between gender or discipline or type of colleges.

Tables 5 and 6 show the practices of medical and dental students regarding preventive measures of controlling HBV. In response to the question concerning screening of Hep B, neither the gender nor pursuing degree showed any statistical significant difference between the responses of males and females, and MBBS and BDS degree students [Table 5]. Students of government colleges indicated significantly more screening of Hep B than the students of private colleges ($P = 0.022$). Furthermore, only about 57% indicated that they have gone through screening for HBV. About

the question related to vaccination for HBV, about half of the respondents indicated that they have completed all the 3 doses. The female students showed significantly higher percentage of complete vaccination (3-doses) as compared to male students ($P = 0.016$) [Table 5]. Furthermore, significantly more students of government colleges completed 3-doses of vaccination as compared to students of private medical colleges ($P < 0.0001$). Male students indicated significantly more needle-stick injury ($P = 0.003$) in their previous clinical practices ($P = 0.003$) as compared to their female counterparts (32.5% vs. 16.4%). However, there was no significant association between gender and "post exposure prophylactic measure." No

Table 5: Practices for hepatitis B with respect to gender and pursuing degree

Question	Gender			Pursuing degree		
	Female	Male	P	MBBS	BDS	P
Screened for hepatitis B?						
No	115 (39.5)	31 (43.1)	0.584	103 (42.4)	43 (35.8)	0.231
Yes	176 (60.5)	41 (56.9)		140 (57.6)	77 (64.2)	
Vaccinated against hepatitis B?						
No	34 (11.4)	17 (21.3)	0.016	34 (13.4)	17 (13.5)	0.012
Yes, 1 dose	62 (20.7)	10 (12.5)		56 (22.1)	16 (12.7)	
Yes, 2 do doses	47 (15.7)	19 (23.8)		34 (13.4)	32 (25.4)	
Yes, 3 doses complete	156 (52.2)	34 (42.5)		129 (51.0)	61 (48.4)	
Ever experienced needle-stick injury?						
No	234 (78.3)	48 (60.0)	0.003	187 (73.9)	95 (75.4)	0.522
Yes	49 (16.4)	26 (32.5)		49 (19.4)	26 (20.6)	
Don't remember	16 (5.4)	6 (7.5)		17 (6.7)	5 (4.0)	
If yes, then postexposure prophylactic measure taken?						
No	29 (59.2)	13 (52.0)	0.555	27 (56.2)	15 (57.7)	0.905
Yes	20 (40.8)	12 (48.0)		21 (43.8)	11 (42.3)	

Table 6: Practices for hepatitis B with respect to institute and year of education

Question	Institute			Year of education				Total
	Government	Private	P	3 rd year	4 th year	5 th year	P	
Screened for hepatitis B?								
No	92 (37.5)	70 (52.2)	0.022	48 (52.7)	53 (57.1)	49 (59.0)	0.165	162 (42.7)
Yes	153 (62.4)	64 (47.8)		43 (47.3)	23 (32.2)	34 (41.0)		217 (57.3)
Vaccinated against hepatitis B?								
No	25 (10.2)	26 (19.4)	<0.0001	15 (16.5)	9 (11.4)	10 (12.0)	0.277	51 (13.5)
Yes, 1 dose	30 (12.2)	42 (31.3)		23 (25.3)	18 (22.8)	15 (18.1)		72 (19.0)
Yes, 2 do doses	33 (13.5)	33 (24.6)		13 (14.3)	14 (17.7)	7 (8.4)		66 (17.4)
Yes, 3 doses complete	157 (64.1)	33 (24.6)		40 (44.0)	38 (48.1)	51 (61.4)		190 (50.1)
Ever experienced needle-stick injury?								
Yes	179 (73.1)	103 (76.9)	0.423	65 (71.4)	56 (70.9)	65 (79.5)	0.019	282 (74.4)
No	49 (20.0)	26 (19.4)		14 (15.4)	20 (25.3)	15 (18.1)		75 (19.8)
Don't remember	17 (6.9)	5 (3.7)		12 (13.2)	3 (3.8)	2 (2.4)		22 (5.8)
If yes, then postexposure prophylactic measure taken?								
Yes	27 (55.1)	16 (61.5)	0.111	9 (64.3)	9 (47.4)	9 (60.0)	0.588	43 (57.3)
No	22 (44.8)	11 (42.3)		5 (35.7)	10 (52.6)	6 (40.0)		33 (42.7)

significant difference was observed between MBBS and BDS, and government and private college students for needle-stick injury. Year of education did not show any significant association any question of practice, except history of needle-stick injury, which was logical. However, positive trend was seen in the number of doses of vaccination.

The correlations of knowledge with number of doses versus needle-stick injury; number of doses versus post exposure prophylactic; and needle-stick injury versus post exposure prophylactic were 0.103, 0.011 and 0.061 respectively. Only the first correlation was significant with $P = 0.044$. The year

of professional education was also significantly correlated ($r = 0.306$) with knowledge.

DISCUSSION

HBV is one of the major causes of mortality and morbidity.^[2] However, it is not only curable but preventable.^[10] It is one of the noteworthy occupational hazards for the healthcare professional.^[4,14] WHO targeted to eliminate the threat of viral hepatitis from public health by 2030.^[5] Pakistan falls into intermediate endemically zone with prevalence ranges from 3% to 7%^[6] as the countries of the world are categorized into three groups: high,

intermediate and low.^[19] To lessening or preventing the transmission of such microorganisms, a controlled observance should be implemented.^[18] Medical or dental students are most vulnerable due to their lesser experience in their professional life.^[23] In treating the patients, they are exposed to blood, saliva mixed with blood and sometimes accidental injury of the injection needles.^[18]

This study was conducted in three private and two government medical colleges of Karachi. The percentage of females in the study was 78.9, which is little more than the percentage mentioned in Khan *et al.*^[7] One of the colleges included in this study enrolls only the girl students, and consequently the percentage of females has been stretched upward.

Twenty nine questions were asked from the students related to the knowledge of HBV. About 30% of the respondents indicated the correct answers of 26–29 questions, which is considered as “good” knowledge. Even though in most of the studies, percentage of “poor,” “moderate” and good knowledge are categorized, it is not comparable with this study. Because, neither the number and nature of the questions were standard, nor the criteria of categorizations were the same. However, about 70% of the respondents indicated at least 25 correct answers, out of 29 questions, which is quite satisfactory. Gebremeskel *et al.*^[24] reported that 52% of the medical students correctly answered more than 50% questions related to the knowledge of HBV, while Ray *et al.*^[23] showed about 83% for good knowledge. Furthermore, Shin *et al.*^[2] indicated that more than half of the Malaysian medical students correctly answered more than 80% of the questions of HBV. However, Rathi *et al.*,^[9] Sannathimmappa *et al.*^[11] and Abidin *et al.*^[14] indicated that the percentage of knowledge regarding HBV is quite <50%, but the respondents were junior medical students in all the three studies.

More than 95% of the responded correctly indicated the cause of HBV. This high percentage is quite understandable, because they are all medical or dental students. However, Ravichandran *et al.*^[17] and Demsiss *et al.*^[10] showed that almost all the students of their studies indicated correct answers. Nevertheless, Sannathimmappa *et al.*^[11] indicated that only 71.2% of the preclinical students mentioned the correct

answer. More than 90% of the students indicated correct answers for transmitting the HBV through in each of possible route: (1) Sharing clothes and utensils, (2) Drinking tap water, (3) Eating unhygienic foods and (4) Mosquitoes. However, most of the other studies^[2,11,21,22,24] showed a lot less percentages regarding these possible routes of transmission. Eighty to ninety percent of the responded indicated that (1) Sexual contact, (2) Blood to blood, (3) Coughing and sneezing and (4) Kissing could be the route of infection. Most of the studies^[2,3,8-10,14,21-24] showed some of the above mentioned causes with the same range of percentages. However, Holla *et al.*,^[22] showed above ninety percent of the correct response for sexual contact, and Kumar *et al.*^[16] and Gebremeskel *et al.*,^[24] revealed that more than ninety percent respondents indicated correct answers for transmission of HBV through blood and fluid. Nevertheless, Al-Shamiri *et al.*^[3] indicated 74% and Sannathimmappa *et al.*^[11] indicated very low percentage (28.8%) of correct responses for transmission of HBV by sexual contact. But the respondents of Sannathimmappa *et al.* study were preclinical medical students. This study showed that the route of transmission through (1) mother to child and (2) sharing needles and syringes received the correct responses in between seventy and eighty percent. Al-Shamiri,^[3] *et al.*, Rathi^[9] and Ray^[21] agreed with the results of transmission from “mother to child,” however, most of the studies^[8,9,11,20,22,24,25] showed more than 80% percent of the correct answer of these questions. Again Sannathimmappa *et al.*^[11] indicated very low percentage of 23.5% for the route of infection from mother to child. The outcome showed that as the year of professional education increases the knowledge regarding transmission of HBV enhanced. Khan *et al.*^[1,7] also indicted that knowledge regarding spread of HBV significantly improved as the age (proxy of year of education) of the students rises. Result of this study also showed that as the year of education increased, the combined knowledge regarding HBV significantly improved. This outcome is in agreement with Demsiss *et al.*,^[10] Ravichandran *et al.*^[17] and Saquib *et al.*^[19] However, Singh and Alok^[18] do not agree with this result.

More than ninety percent of the students knew that the HBV affected more on the Hepatobiliary

system. This percentage of correct answer agreed with most of the other studies.^[2,10,22,24] However, the respondents of Sannathimmappa *et al.* study again showed a poor result of 28.0%.^[11]

More than 90% of the respondents showed that liver cirrhosis could occur due to HBV. Most of the studies^[2,10,22-24] showed same responses within $\pm 5\%$ of this percentage. However, Sannathimmappa *et al.* study again showed very low percentage of only 28% for this question.^[11] About a quarter (23.0%) of the respondents indicated that HBV is completely curable and almost sixty percent (59.1%) reported that it was curable up to a certain level. Khan *et al.*^[1,7] showed almost the same results similar to this study. Furthermore, some studies^[8,10,14,20,24] give almost the same responses similar to this study, while other studies^[16,22] reported higher percentage of curability. Khan *et al.*^[7] agreed with present study that female students were significantly showed higher percentage for “curable up to the certain level” than male students. However, Khan *et al.*^[11] did not agree with the result of this study of significantly higher percentage with students of private intuitions towards “curable up to the certain level’ against public intuitions” students. However, the study agrees with Khan *et al.*^[7] that as the year of education increased the knowledge of curability also increased. Nine students out of ten agreed that Hep B vaccine prevents the HBV and neither gender, discipline nor type of institutions showed any significant difference with this opinion. Most of the studies^[8-10,21,24] showed almost the same percentage of the efficacy of the Hep B vaccine similar to this study. However, the preclinic students of Sannathimmappa *et al.*^[11] study showed only 72% for this question. The knowledge of contraindication of Hep B vaccine was quite poor among the respondents. Less than half (48%) of the respondents picked up the right answer of severe allergy from vaccine component. The combined knowledge about HBV was superior among women, MBBS students, government institutions’ students and 5th year students as compared to respective counter groups. Most of the studies^[7,10,15,18] agreed with the improvement of knowledge with year of education. However, few studies^[19,20] did not show the direct relationship between knowledge and year of education.

About one third of the students (31.1%) were concerned about the improper injection techniques. Furthermore, 5.5% opined that this vaccine is ineffective and 14.2% indicated that it has some side effects. Shin *et al.*^[2] reported that 7.6% of the respondents indicated the side effects of the vaccine and about 10% showed ineffectiveness. However, 83% of the Kumar *et al.*^[16] respondents did not vaccinated due to the fear of side effects of the vaccine. Almost all (95.8%) of the students agreed that it should be mandatory for all the medical and dental students to be vaccinated for Hep B. Most of the studies^[9,16,17] showed almost the same percentage for this question in their research. It simply means that students are quite aware of consequences of this virus. In align with this study Singh and Alok *et al.*^[18] and Saquib *et al.*^[19] also showed that attitude of the students improved as level of education increased.

More than half of the respondents (57.3%) indicated that they had been screened for HBV. The students from government institutions showed significantly higher percentage of screening than students from private institutions. Since the screening and other treatments are free of cost in the government hospitals attached with the government medical colleges, and furthermore the students of the government medical colleges are relatively better knowledgeable due to higher merit. Consequently, they are more conscious and have better opportunity to screen themselves. Therefore they get screened in higher percentage than the students of private medical colleges. Shin *et al.*^[2] showed almost comparable percentage of screening of HBV like this study. However, the studies of Demiss *et al.*,^[10] Singh and Alok^[18] and Gebremeskel^[24] showed quite a lower positive responses against this question. Half of the students pointed-out that they had completed the 3 doses and one-third had one or two doses of vaccination of HBV. Female and government institution students showed significantly higher percentage of complete 3 doses as compared to male and private institution students. Earlier report^[7] from Pakistan showed almost the same frequency (55%) of complete doses among the medical students. However, incomplete vaccination (1 or 2 doses) were quite lower than the current study.^[7] Some studies^[2,18,26] showed noticeably high percentage of vaccination of full doses,

while some^[3,12,19,23] showed comparable percentages as compared to this study. However, few studies^[9,11,16,17,24] showed markedly low coverage of HBV vaccination among the medical students. It should be noted that all these studies of low percentages were conducted either in India or in low-socioeconomic African countries. Every fifth student of the responded reported that they have experienced the needle–stick injury in the past and out of those students, only 43% had taken the postexposure prophylactic measure. Earlier studies^[1,7] from Karachi indicated that about half of the students experienced needle pricks during their clinical rotations. These studies were conducted ten years ago. An other study^[10] from Ethiopia also showed that about fifty percent students reported that they had experience of needle injury in their training period. This noticeable reduction in the prick injuries could be either due to better teaching method of the safety measures or improvement in the instruments to avoid injury. This study showed that there was direct correlation between complete vaccination (3-doses) and the year of education. Nevertheless, there was no association with screening of HBV. Khan *et al.*^[7] outcomes agreed with these results.

There are three main limitations linked with this study.

(1) It is a cross-sectional questionnaire based study. Therefore causal relationship cannot be determined. (2) It is a self-reported, therefore opinion bias cannot be ruled out. The respondents are medical students, therefore due to social and cultural demands could leads to over-reporting of vaccination and indicating better habits than actual practices. Nevertheless, one study^[27] showed that self-reporting provided higher sensitivity when collecting data of vaccination among elderly.(3) Even though this study covered 5 medical and dental colleges of among 20 medical and dental colleges of Karachi, the outcomes of this study cannot be generalized for whole Pakistan.

Even though this study showed satisfactory outcomes of most of the areas of KAP among medical and dental students, some areas such as curability of the vaccine, screening and vaccination for HBV and post exposure prophylactic measure need correction and modification of knowledge among the medical/dental students. As Calabro indicated and reported by Khan *et al.*^[7] that a pretest

followed by lecture, demonstration of standard operating procedure of infection control practices and then a posttest could change the attitude and improve the knowledge regarding the bold-borne diseases among the medical and dental students.

It should be noted that the respondents were medical students, who are supposed to be more concerned with their health affairs. But only 50% of them were vaccinated against Hep B with complete 3-doses. This outcome implies that probably other sectors of the society could have vaccinated inferior number of doses against Hep B virus. Keeping this fact in mind the government of Pakistan has introduced ‘Prime Minister’s Programme for Hepatitis in 2019 to eliminate viral hepatitis B and C infections from the country by 2030. Government is planning to test and treat 70% of the population by 2023. All together over 140 million people will be screened free of cost.^[28,29]

CONCLUSION

Study revealed that the knowledge and practices of medical and dental students of Karachi are satisfactory. Attitude regarding Hep B vaccination has been improved. However, few elements, such as concerns regarding vaccine, complete (3 doses) vaccination and post exposure prophylactic measure need to be focused in the curriculum and workshops for further improvement.

Authors’ contributions

Nazeer Khan approved the research objective, facilitate for data collection, analyze the data and wrote the manuscript. Saba Asghar and Hassan Ahmed conceived the research idea and collected the data, helped in manuscript writing and reviewed the final article. Muhammad Asad Ali Khan collected the data and reviewed the manuscript.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Compliance with ethical principles

The study followed the Nuremberg Codes and Declaration of Helsinki for participants’ voluntary consent without any constraint and compulsion.

The study was approved by the Institutional Review Board of JSMU.

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