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Original Article

Hepatitis B Seropositivity and Immune Status in Dental Students

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ABSTRACT:
Background: Hepatitis B infection is one of the major public health problems globally and is the tenth leading cause of death. Dental surgeons are those HCWs who majorly deal with blood and saliva while performing surgical interventions related to dento-maxillofacial region, the chances of blood borne infections especially of hepatitits B are very high. Hence, we estimated the prevalence and degree of hepatitis B viral infection, the vaccination status and the efficacy of vaccine. **Materials & methods:** The students were divided into two groups based on their vaccination status. Group 1 (Non – vaccinated dental students): In this group, HBsAg was investigated. Those students who were HBsAg positive were further investigated for HBeAg. Group 2 (Vaccinated dental students): In this group, Anti-HBs titres were evaluated. Those who had titres > 10 mIU/mL were considered as immune individuals against hepatitis B (responders to vaccine). Those who had titres < 10 mIU/mL were considered as non responders to vaccine and further evaluated for HBsAg. Those students who were HBsAg positive were further investigated for HBeAg.All the results were analysed by SPSS software version 21. **Results:** All the dental students were found to be seronegative for HBV infection. Out of all the students who gave consent to be part of the study, 46% were vaccinated and 54% were non-vaccinated students. Seroprotection against HBV infection decreased significantly with increasing time from last vaccination due to waning of anti-HBs antibody titres. **Conclusion:** DHCWs are at high risk in contacting HBV infection.
Key words: Dental, students, Hepatitis B, vaccination, healthcare workers

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INTRODUCTION

Hepatitis B infection is one of the major public health problems globally and is the tenth leading cause of death. According to WHO, hepatitis B infection is the world's most common liver infection which is caused by hepatitis B virus (HBV).[1] In developing regions, 40%-65% of HBV infections in health-care workers occurred due to per-cutaneous occupational exposure. In contrast, the fraction of HBV was less than 10%, in developed regions, largely because of immunization and post-exposure prophylaxis.[2] Studies have shown that the risk of developing clinical hepatitis among HCWs who sustained injuries from needles contaminated with blood containing HBV is variable from 1-6% (if the source is HBeAg negative) and 22-31% (if source is HBeAg positive).[3,4] Dental surgeons are those HCWs who majorly deal with blood and saliva while performing surgical interventions related to dento-maxillofacial region, the chances of blood borne infections especially of hepatitits B are very high.[5,16] Hence, this study was aimed at estimating the prevalence and degree of hepatitis B viral infection, the vaccination status and the efficacy of vaccine.

METHODS

The undergraduate dental students of regular batch studying in JSS Dental College and Hospital, Mysuru were included. Ethical approval was obtained from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. The students were divided into two groups based on their vaccination status: Group 1 (Non – vaccinated dental students): In this group, HBsAg was investigated. Those students who were HBsAg positive were further investigated for HBeAg. Group 2 (Vaccinated dental students): In this group, Anti-HBs titres were evaluated. Those who had titres > 10 mIU/mL were considered as immune individuals against hepatitis B (responders to vaccine). Those who had titres < 10 mIU/mL were considered as non responders to vaccine

and further evaluated for HBsAg. Those students who were HBsAg positive were further investigated for HBeAg.

In the present study, the following were evaluated:

i. HBsAg screening in non vaccinated dental students
ii. HBeAg screening for HBsAg positive non vaccinated dental students
iii. Estimation of Anti-HBs antibody titres in vaccinated dental students
iv. HBsAg screening for vaccinated dental students with anti-HBs antibody titres < 10 mIU/ml.
v. HBeAg screening for HBsAg positive vaccinated dental students with anti- HBs antibody titres < 10 mIU/ml.

5 ml of blood was drawn from median cubital vein and collected in vacutainer tubes. Blood was collected in clot activator vacutainer tube which was centrifuged at approximately 2000 RPM for 15 minutes and the serum obtained was removed rapidly and carefully. It was used for both HBsAg screening and Anti-HBs antibody titre estimation using SURASE B-96 (TMB) ELISA kit and ANTISURASE B-96 (TMB) ELISA kit respectively.

All the non vaccinated dental students and vaccinated dental students with anti-HBs antibody titres > 10 mIU/ml were investigated for HBsAg. Procedure for HBsAg screening was adopted as per the SURASE B-96 ELISA kit guidelines. Procedure for Anti-HBs antibody was adopted as per the ANTISURASE B-96 ELISAkit guidelines. All the results were analysed by SPSS software version 21 and were assessed by Cramer's V test.

RESULTS

The final sample size was 352 dental students. Out of 352 students, 189 were non vaccinated students and 163 were vaccinated students. Out of 352 students, 104 were male students and 248 were female students. (Table 1) Among the male students, 45 were vaccinated and 59 were non vaccinated and among the female students, 118 were vaccinated and 130 were non vaccinated. (Table 2) All the non vaccinated dental students were screened for HBsAg and were found to be seronegative. For vaccinated dental students, anti-HBs antibody titres were estimated in which out of 163 students, 139 students were responders to vaccination and 24 were non responders. Out of 139 students who were responders to vaccination, 32 were males and 107 were females. Out of 24 students who were non responders to vaccination, 13 were males and 11 were females. The maximum response to vaccination was shown by female students. (Table 3 & 4) Out of 163 vaccinated dental students, 74 students showed antibody titres > 250mIU/ml and 24 students showed < 10 mIU/ml with remaining 65 students having titres between 10 and 250 mIU/ml. A correlation was established between the antibody titres and the post vaccination time intervals and was found to be statistically significant. Hence, based on the post vaccination status of students with respect to time from initial vaccination, three groups were created; Group A (1 to 4 years), Group B (5 to 10 years) and Group C (> 10 years). Out of vaccinated students, 77 students were under group A, 52 students were under group B and 34 students were under group C. The students under group A showed excellent immunity, group B showed good immunity and group C showed fair to poor immunity inferring that as the time intervals increase, the antibody titres will decrease (p- value < 0.00). (Table 5) The students who were non responders to vaccination were screened for HBsAg and were found seronegative for the same. As there were no HBsAg positive cases, HBeAg, the marker for degree of viral replication was not required.

Table 1: Distribution of dental students participating in the study with informed consent with % in parenthesis

Year	Total no. of students	Students with consent (%)	Students without consent (%)
I	100	100 (100)	0 (0)
II	96	41 (43)	55 (57)
III	99	87 (88)	12 (12)
FINAL	83	65 (78)	18 (22)
INTERNS	75	62 (83)	13 (17)
TOTAL	**453**	**352 (78)**	**101 (22)**

Table 2: Distribution of dental students based on vaccination status with % in parenthesis

Year	Group 1: Non-vaccinated students (%)	Group 2: Vaccinated students (%)
I	83 (83)	17 (17)
II	31 (76)	10 (24)
III	19 (22)	68 (78)
FINAL	42 (72)	23 (28)
INTERNS	17 (27)	45 (73)
TOTAL	189 (54)	163 (46)

Table 3: Distribution of Responders & Non-Responders to vaccination based on Anti-HBs antibody titres with % in parenthesis

Anti HBs Antibody Titres (mIU/ml)	I Year (%)	II Year (%)	III Year (%)	Final Year (%)	Interns (%)	Total (%)
> 10 (RESPONDERS)	10 (59)	8 (80)	64 (94)	22 (96)	35 (78)	139 (85)
< 10 (NON-RESPONDERS)	7 (41)	2 (20)	4 (6)	1 (4)	10 (22)	24 (15)

Table 4: Correlation between gender and response to Hepatitis B vaccination

			GENDER		Total
			M	F	
Response to Hepatitis B vaccination	Responders	Count	32	107	139
		%	69.6%	91.5%	85.3%
	Non-responders	Count	14	10	24
		%	30.4%	8.5%	14.7%
Total		Count	46	117	163
		%	100.0%	100.0%	100.0%

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.278	.000
	Cramer's V	.278	.000
N of Valid Cases		163	

Table 5: Efficacy of the hepatitis B vaccination based on the post vaccination status of antibody titre values at different time intervals with % in parenthesis

Antibody Titres (mIU/ml)	Group A (%)	Group B (%)	Group C (%)
<10	0 (0)	0 (0)	24 (71)
10 to 50	0 (0)	16 (31)	7 (20)
51 to 100	0 (0)	15 (29)	3 (9)
101 to 150	0 (0)	11 (21)	0 (0)
151 to 200	0 (0)	9 (17)	0 (0)
201 to 250	4 (5)	0 (0)	0 (0)
>250	73 (95)	1 (2)	0 (0)
TOTAL	77 (47)	52 (32)	34 (21)
Group A: 1 to 4 Years Group B: 5 to 10 Years Group C: > 10 Years			

DISCUSSION

Based on the history of vaccination status of students, two groups were created; vaccinated and non vaccinated dental students. Among all the students who consented to be part of the study, only 46% were vaccinated, which is less than the studies done among dental students in countries like Japan[6], Iran[7,8], Brazil.[9,10] Hence, more awareness regarding vaccination to be created among dental students. The present study has showed 85% of the dental students to be immune against hepatitis B. But few other studies have shown a higher percentage of dental students to be responders to vaccination. The responders to vaccination varied from being 95%[11], 92.3%[12] to 92.5%[13]. When overall gender distribution was considered, it was found that 77% of vaccinated female students were responders to vaccination. The results of the present study were similar with the studies done by Fang et al., [14] Mohd. Abdul et al.,[15] and Shruthi Hegde et al.[13]Among the various groups of individuals, HCWs and more specifically DHCWs who come in contact with patient's blood and saliva are the high risk category in acquiring this infection.

HBV infection is one of the dreaded infections since there is no permanent cure once infected. There are various symptomatic treatment modalities available, but it is not permanent or cost effective. Prophylactic vaccination seems to be the only hope against this infection. Different studies have repeatedly proved that the HCWs need to be aware, take precautions and get prophylactically immune against this infection. Our present study has also revealed that only 46% of the dental students were vaccinated against HBV, which is comparatively less than that of other developed countries, and better than few developing countries. This implies that more stringent and rigid rules need to be enforced to improve the vaccination status of this group. With regard to the seroprevalence of HBsAg, ours is the only study indicating 0% prevalence among DHCWs. This could be because of the small sample size and better healthcare practices. Variations are seen with regard to gender distribution of vaccination status and responders to vaccination globally. In the present study,

females showed better vaccination status and were also greater responders to vaccination. This could be because of the greater number of female students enrolled for the study. A more reliable result can be expected by matching the study groups. The antibody titres in vaccinated group of individuals indicate the protective efficacy of the vaccine. We found a significantly good result with respect to the antibody titres, reaffirming the protective nature of the vaccine. Thus, the present study, which is the first of its kind among Indian dental students which stresses the need for awareness regarding HBV infection, the precautions to be taken and the prophylactic measures to be made mandatory among the high risk DHCWs.

CONCLUSION

DHCWs are at high risk in contacting HBV infection. Hence, a thorough education and evaluation of their HBV status at the entry point to the profession be made mandatory. We also recommend the institution of vaccination along with its booster doses to be strictly enforced to all the students.

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