

## Research Article

# Seroprevalence of hepatitis B antigenemia among dental students in a private South Indian dental institution

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### ABSTRACT

**Background:** Hepatitis B is the most important infectious occupational disease for the dental health care workers (DHCWs). DHCWs frequently come in contact with blood and saliva and hence are at risk for Hepatitis B virus (HBV) exposure. Studies indicate that DHCWs, through occupational exposure, may have a 10 times greater risk of becoming a chronic hepatitis B carrier than the average citizen.

The study was conducted to estimate the seroprevalence of HBV infection among dental students enrolled at a private dental institution in Mysuru, Karnataka, India.

**Methods:** A cross sectional seroprevalence study was conducted which included dental students who were enrolled in the dental institution. Data were collected by administering a standard questionnaire to every student regarding their personal health information. Their blood samples were collected and tested by Enzyme Linked Immunosorbent assay (ELISA) for Hepatitis B surface antigen.

**Results:** 352 dental students who gave consent were screened out of a total of 453 dental students. Out of 352 students, 163 (46%) were vaccinated and 189 (54%) were non-vaccinated. All the dental students were found to be seronegative for HBV infection.

**Conclusions:** Though a low rate of HBV infection was observed among dental students, a significant number of dental students were non-vaccinated which suggests a need for proactive implementation of HBV vaccination programme.

**Keywords:** Dental health care workers, Hepatitis B, Hepatitis B surface antigen, South India, Vaccination

### 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). Worldwide, more than two billion of the population have evidence of past or recent HBV infection and there are more than 350 million chronic carriers of

this infection. As a consequence of this, approximately 600,000 die every year from HBV related liver disease or hepatocellular carcinoma in the world. In India, Hepatitis B prevalence among general population ranges from 2 to 8%, which places India in an intermediate endemic zone for HBV.<sup>1</sup>

The annual proportion of health-care workers (HCWs) exposed to blood-borne pathogens is 5.9% for HBV. In

developing regions, 40%-65% of HBV infections in HCWs 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.<sup>2</sup> 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% and 22-31%.<sup>3,4</sup>

In dental set up, the possible forms by which HBV infection can be transmitted are from contact with blood or saliva of infected patients during dental procedures.<sup>5,6</sup> DHCWs who do not wear gloves while doing procedures are at a higher risk of acquiring HBV infection.<sup>7</sup> Although several body fluids contain Hepatitis B surface antigen, blood contains the highest HBV titres and is the most important vehicle of transmission in the healthcare settings.<sup>8</sup> It has been confirmed that HBV transmission occurs from exposure to saliva and gingival crevicular fluid (GCF), which in turn makes DHCWs more vulnerable for HBV infection.<sup>9</sup> HBV is highly contagious and is 50-100 times more infectious than HIV.<sup>10</sup> Furthermore, despite the availability of Hepatitis B vaccination since 1982, a large proportion of HCWs, in most countries are still unvaccinated. It varies from 18%, being lowest in Africa to highest of 77% in Australia and New Zealand.<sup>2</sup>

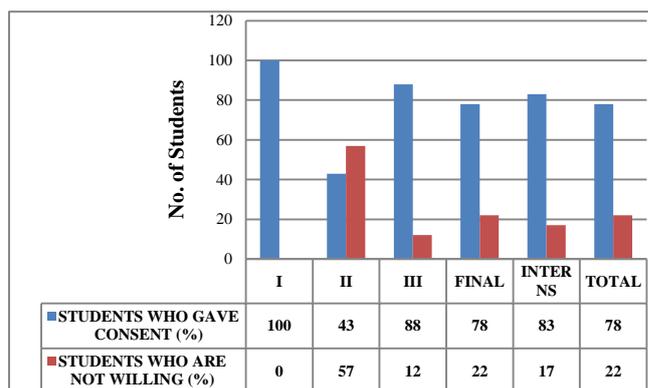
DHCWs majorly deal with blood and saliva while performing surgical interventions related to dento-maxillofacial region, the chances of blood borne infections especially of hepatitis B are very high. Very few studies have been conducted on the seroprevalence of HBV infection among dental students in Indian scenario. Hence, this study was aimed at estimating the seroprevalence and degree of HBV infection among dental students. It was also aimed at educating, creating awareness and sensitizing the dental students about the HBV infection. Further, the non-vaccinated dental students were motivated towards vaccination. They were also educated regarding safe and precautionary practices against HBV.

**METHODS**

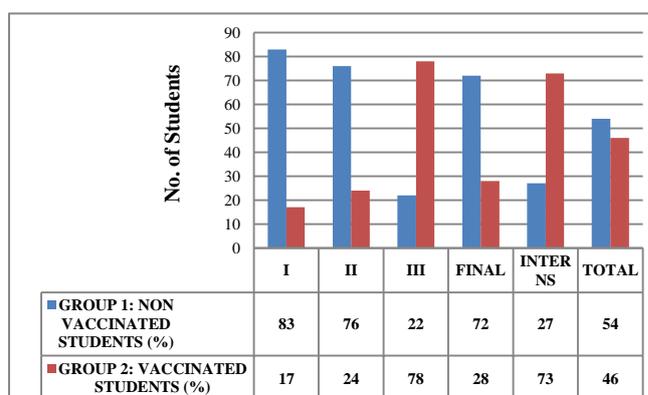
A cross-sectional serologic survey study was conducted among the dental students of JSS Dental College & Hospital, Mysuru, Karnataka, India between January 2014 to January 2015. The study population comprised of undergraduate dental students in the age group of 18-24 years from all the years of study (1<sup>st</sup> year, 2<sup>nd</sup> year, 3<sup>rd</sup> year, final year and interns). Ethical approval was obtained from the institutional ethical committee. Written informed consent was obtained from each participant, and anonymity of the participant was maintained throughout the study. Volunteers who gave history of jaundice or any chronic liver diseases, with known Hepatitis B surface antigen (HBsAg) positive status, patients with documented immune suppression or on prolonged steroid

therapy or anti-tubercular treatment and pregnant women were excluded from the study. A total of 352 students constituted the sample size for the study. Personal health information of each dental student was recorded using a standard questionnaire which included demographic details of the dental student regarding their age, gender, year of study, smoking and alcohol intake history, past history of blood transfusions, status of hepatitis B vaccination, exposure to blood or any other blood products and the knowledge about the use of personal protective devices. 5 ml of blood sample was collected from each student by venipuncture using a vacutainer device for serologic evaluation of HBV status. From the blood sample, serum was separated as per standard method in use and stored at -20°C to -80°C until analysis. HBsAg was detected by enzyme linked immunosorbent assay (ELISA) using commercial kit (SURASE B-96 TMB by General Biologicals Corporation, Taiwan) according to manufacturer’s protocol. The prevalence rate of HBV infection was calculated for the total study population. Descriptive statistics were generated for the responses.

**RESULTS**



**Figure 1: Distribution of dental students participating in the study with informed consent.**



**Figure 2: Distribution of dental students based on vaccination status.**

A total of 352 (78%) dental students gave consent out of 453 dental students and 101 (22%) refused to participate in the study. The maximum consent to participate in the study was given by 1st year dental students (100%) followed by 3rd year dental students (88%), interns (83%), final year students (78%) and the least by 2nd year students (43%). (Graph 1) Out of 352 dental students, 189 (54%) were vaccinated and 163 (46%) were non-vaccinated. The maximum number of vaccinated dental students were from 3rd year (78%), followed by interns (73%), final year (28%), 2nd year (24%) and the least were from 1st year (17%). (Graph 2) Out of 352 students, 248 (71%) were females and 104 (29%) were males. A total of 118 (48%) female students were vaccinated and 130 (52%) were non vaccinated. 45 (43%) males students were vaccinated against 59 (57%) being non-vaccinated. (Table 1) There was more number of vaccinated female students than male students.

**Table 1: Overall gender distribution of dental students who gave consent to participate & who were vaccinated & non vaccinated with % in parenthesis.**

	Males	Females
Total no. Of students	104 (29)	248 (71)
Vaccinated students	45 (43)	118 (48)
Non-vaccinated students	59 (57)	130 (52)

All the students who participated in the study were screened for HBsAg and were found to be seronegative for the same. Hepatitis B disease awareness lecture was organized for the dental students from all years of study in order to motivate and sensitize them to get vaccinated against hepatitis B. All non-vaccinated dental students and vaccinated dental students were prescribed Hepatitis B vaccine and booster dose of hepatitis B vaccine respectively. They were counseled to get checked for serological response after full course of vaccination in order to estimate their immune status.

## DISCUSSION

HBV infection is a global health problem and it is estimated by WHO that approximately one-third of the world population has been infected with HBV with serological evidence of past or present infection. According to WHO, 5 to 7% of the world's population suffer from chronic HBV infection and approximately 15 to 40% of patients infected with HBV will develop life threatening liver consequences including cirrhosis, liver failure and hepatocellular carcinoma resulting in death of 0.6 to 1.2 million people per year due to HBV.<sup>11-14</sup>

Based on the prevalence of Hepatitis B surface antigen (HBsAg), countries are classified as having high (where  $\geq 8\%$  of the population is HBsAg positive), intermediate (2-7%) or low ( $< 2\%$ ) HBV endemicity. Areas of high endemicity include

South-East Asia, China, most of Africa, most of Pacific Islands, the Amazon basin and parts of the Middle-East. The areas of intermediate endemicity include South-Asia, Eastern and Southern Europe, Russia, Central and South America. On the other hand, the areas with low endemicity include United States, Western Europe and Australia.<sup>15</sup>

While South-Asia including India has been grouped as countries with intermediate endemicity, the sheer enormity of the population of the region accounts for a large chunk of the entire pool of HBV carriers of the world.<sup>16</sup> India has over 40 million HBV carriers and accounts for 10-15% of the entire pool of HBV carriers of the world. Of the 25 million infants born in India, it is estimated that over 1 million run the lifetime risk of developing chronic HBV infection. Every year over 1,00,000 Indians die due to HBV infection related illnesses.<sup>17,18</sup> There are reports of overall rate of HBsAg positivity ranging between 2 to 4.7%.<sup>19,20</sup> A high endemicity of HBV infection has been reported in tribal populations of India, in which the tribes of Andaman and Nicobar Islands show very high levels of HBsAg positivity ranging from 23.3% to 35%.<sup>21,22</sup> There are hyperendemic foci of HBV infection in parts of Arunachal Pradesh and Manipur.<sup>23,24</sup>

Spread of HBV infection in many South Asian countries is mainly attributed to unsafe blood supply, reuse of contaminated syringes, and lack of maternal screening to prevent perinatal transmission and delay in the introduction of hepatitis B vaccine. HCWs especially DHCWs have an occupational risk of infection with HBV since dental procedures make DHCWs exposed to blood, saliva and GCF. Hence, they are likely to have the maximum risk. HBV infection is transmitted by skin prick with infected and contaminated needles and syringes or through accidental inoculation of minute quantities of blood during surgical and dental procedures. It can be prevented by strict adherence to standard practices and techniques and routine use of appropriate barrier precautions to prevent skin and mucous membrane exposure while handling blood and other body fluids of all patients in healthcare settings.<sup>25</sup>

According to different studies done in India, 56.5%,<sup>26</sup> 55.4%,<sup>27</sup> 42.8%<sup>28</sup> of HCWs were vaccinated and 0.4% HCWs were found to be seropositive for HBsAg.<sup>26</sup> In India, very few reliable studies regarding the seroprevalence of hepatitis B and its vaccination coverage among HCWs exist and it includes the data from northern part mostly. Hence, this estimate cannot be representative of the whole country. Even in developing countries, the situation is not satisfactory.

Other studies done abroad have shown a prevalence of HBV infection among HCWs as 4.3%<sup>29</sup> and 5.5%.<sup>30</sup> WHO has reported that the percentage of vaccinated HCWs is high in South East Asian Region. They have also estimated the mean immunization rate of HCWs for HBV to be 18% in Nigeria.<sup>2,32</sup> In US, according to one study, 75% HCWs were vaccinated.<sup>33</sup> In Sweden, 40% HCWs were reported to be fully vaccinated and 79% of HCWs had received at least one dose of vaccine.<sup>34</sup>

Different studies on DHCWs have shown that 48.2%<sup>35</sup> and 90%<sup>36</sup> were vaccinated against HBV infection. Another study done in Brazil on dental students and dentists have shown the seroprevalence of HBV infection to be 6.8% among dental students at the beginning of the course and 7.1% at the completion of the course, while the seroprevalence was 23.3% for dentists.<sup>37</sup>

Not many studies exist with regard to the seroprevalence of HBV infection and the vaccine status among DHCWs in Indian population. Further, no studies exist with dental students as the study population. The present study has shown 0% seroprevalence of HBV infection among 78% of dental students who volunteered for the study. Our study has showed that only 46% of dental students were vaccinated which is less than that of developed countries. A relatively more number of female students were vaccinated than males. Although, all the dental students were seronegative, which is better than the developed countries, the vaccination coverage is comparatively low than the other countries. Further we saw 22% of non-participation by the students and < 50% students being non-vaccinated.

## CONCLUSIONS

The present study reaffirms the importance of HCWs especially DHCWs being immunized with hepatitis B vaccine. Considering the findings in our study and similar studies both in India and abroad, we would like to emphasize that the overall prevalence percentage of HBV infection is less as compared to past findings. Health education should be carried on regular basis in the dental institutions to raise the awareness of all dental students and staff to this infection and standard safety measures should be adopted in handling of blood, other body fluids and sharps. Compulsory evaluation and vaccination of the dental students should be done in dental institutions.

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