

ORIGINAL ARTICLE

Prevalence of Hepatitis B surface antigen in dental personnel

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ABSTRACT

Context: Hepatitis B, a viral disease affecting the liver has high morbidity and mortality. Hepatitis B surface antigen (HBsAg) in serum is used to detect presence of active disease and chronic carrier status. The disease is transmitted predominantly through blood and saliva, hence dental professionals are considered a high risk group. **Aim:** To detect presence of HBsAg in serum of dental professionals. **Subjects and Methods:** The study was conducted in two parts viz., one in the year 1991 on 100 dental professionals in Nagpur using reverse passive hemagglutination and the other in 2012 on 50 dental professionals in Chennai using immunochromatography. **Results:** Ten percent of dental professionals screened in 1991 and 2% of dental professionals screened in 2012 showed HBsAg positive status and were predominantly periodontists with a history of needle-stick injury. **Conclusion:** This study highlights the importance of Hepatitis B vaccination and periodic evaluation of antibody titer to prevent spread of the disease.

Key words: Dental professionals, hepatitis B, hepatitis B surface antigen, hepatitis B vaccination

INTRODUCTION

Hepatitis is the most common infectious inflammatory illness of the liver caused by deoxyribonucleic acid (DNA) virus. Though several serotypes have been identified, infection caused by hepatitis B is more deleterious due to the risk of prolonged carrier state and transformation to hepatocellular carcinoma. About a third of the world population have been infected at some point in their lives and about 350 million people are chronic carriers. In India, the prevalence of this disease is 2–7%.^[1]

Hepatitis B virus belongs to Hepadnavirus family and was first discovered by Blumberg *et al.*, in 1965.^[2] The virus particle (virion) consists of an outer lipid envelope and icosahedral nucleocapsid core. The nucleocapsid encloses the viral DNA and DNA polymerase that has reverse transcriptase activity. Serum of infected individuals contain lipid and protein bodies which lacks a core and is not

infectious and forms a part of the surface of the virion called as hepatitis B surface antigen (HBsAg) or Australia antigen in addition to Dane particles.

Hepatitis B infection is a transmissible disease and is predominantly transmitted through blood and blood products of infected patients.^[3] Since dental professionals and dental auxiliaries come in frequent contact with blood and saliva, they bear a high risk of acquiring hepatitis B infection from infected patients. Though there is extensive awareness about hepatitis B infection among Indian dental professionals, there is still an increase in mortality rates due to the disease and also cross infection occurs between dental professionals and public. Importance given to awareness about hepatitis B infection has decreased due to the emergence of new illness like sub acute respiratory syndrome (SARS). With regard to serology of the disease, presence of HBsAg in blood closely relates to the presence of infection and carrier state. Hence, detection of HBsAg in serum is of high diagnostic value. The numerous techniques available to diagnose HBsAg include gel diffusion, complement fixation, hemagglutination and hemagglutination inhibition, platelet aggregation reaction test, latex agglutination, electron microscopy, immune electron microscopy, polymerase chain reaction, radioimmunoassay, enzyme-linked immunosorbent assay (ELISA), reverse passive hemagglutination, counter immunoelectrophoresis and immunochromatography.^[4]

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With this background we conducted a cross-sectional study in two parts: One in the year 1991 on 100 dental professionals in Nagpur and the other in 2012 on 50 dental professionals in Chennai to detect active disease and carrier state in order to create a complete awareness of this illness among dental professionals.

SUBJECTS AND METHODS

In the first part of our study, 100 dental professionals belonging to various specialties in Nagpur were screened for the presence of HBsAg using reverse passive hemagglutination technique for which 5 cm³ blood was collected from the antecubital vein. Serum was separated and a commercially available AUSCELL kit was used for the detection of the antigen. In the second part of our study, 50 dental professionals in Chennai were screened using immunochromatography. The study was approved by Institutional Ethics Committee, Sri Ramachandra University. Informed consent was obtained; following which 1ml blood sample was drawn from the antecubital vein. A commercially available HEPACARD assay kit was used to detect presence of HBsAg after separation of serum. Both parts of the study included a questionnaire on medical history, duration and use of barrier system during practice.

RESULTS

In our study, 10% of the dental professionals screened in 1991 showed positivity of HBsAg and 2% of the dental professionals screened in 2012 showed HBsAg positive status [Table 1]. In 1991 and 2012, greater proportions of male dental professionals were affected than females [Table 2] and were predominantly periodontists. In both the studies, dental professionals who had more than 5 years of practice and history of needle-stick injury were HBsAg positive [Table 3]. In 1991, 12% of dental professionals used gloves and 49% of dental professionals used face mask and none of them used disposable needles; whereas in 2012, all the dental professionals used face mask, gloves and disposable needles [Table 4]. In 2012, dental professionals showing HbsAg positive status had low antibody titer, though all the dental professionals gave history of hepatitis B vaccination [Table 5].

DISCUSSION

Hepatitis B, an insidious viral disease, has high morbidity and mortality. Our country has a prevalence rate of 2–7%.^[1] The disease is considered more dangerous than HIV; since 50% of the infected individuals are undiagnosed, as the manifestation of the disease is mainly subclinical.^[5] Although hepatitis B is transmitted mainly through blood and blood products, recent studies have shown that the virus exists in saliva and can be transmitted from infected individuals.^[6] Dental professionals are at a high risk of acquiring and transmitting the disease since they work in a field contaminated with blood and saliva.^[7]

Table 1: Proportion of dental professionals showing HBsAg positive status

Results	1991	2012
No. of dental professionals screened	100	50
No. of dental professionals showing presence of HBsAg	10	1
Percentage	10	2

HBsAg: Hepatitis B surface antigen

Table 2: Gender predilection of HBsAg among dental professionals

Gender	No. tested		No. positive		Percentage	
	1991	2012	1991	2012	1991	2012
Male	46	30	3	1	6.52	3.33
Female	54	20	7	0	12.96	0

HBsAg: Hepatitis B surface antigen

Table 3: Duration of practice among study population and HBsAg positivity

Years of practice	No. tested		No. positive		Percentage	
	1991	2012	1991	2012	1991	2012
<5 years	27	10	1	0	3.7	0
>5 years	73	40	9	1	12.32	2.5

HBsAg: Hepatitis B surface antigen

Table 4: Use of personal protection among dental professionals in 1991 and 2012

Barrier system	No. tested		Percentage	
	1991	2012	1991	2012
Use of gloves	12	50	12	100
Use of face mask	49	50	49	100

Table 5: HBsAg antibody titer levels and HBsAg positivity among dental professionals in 2012

Antibody titer	No. tested	No. positive	Percentage
High	48	0	0
Low	2	1	50

HBsAg: Hepatitis B surface antigen

With regards to serology of the disease, HBsAg is the first serologic marker to appear (2–4 weeks after exposure).^[1] Presence of the antigen not only indicates active disease but can also be used to diagnose chronic carrier status.^[8] Hence, we conducted a study to detect the presence of HBsAg in serum of dental professionals in two parts viz., one at Nagpur in 1991 and the other in 2012 at Chennai.

We used reverse passive hemagglutination technique to detect the antigen in serum of 100 dental professionals in 1991 as the test is highly sensitive, specific and easy to perform; and less time-consuming, taking about 1.5 hour. In 2012, we used immunochromatography to detect HBsAg in serum of 50 dental professionals as the technique has high sensitivity, specificity and can be performed as a chairside test. We also asked the dental professionals to complete a questionnaire

regarding medical history, duration of practice and use of barrier system to determine if any of these was associated with HBsAg positivity.

Our results showed 10% positivity of HBsAg in dental professionals screened in 1991 and 2% positivity in 2012 [Table 1]. In both the studies, dental professionals who had more than 5 years of practice showed higher HBsAg positive status. The relation with increased years of practice and HBV positive status was also observed by Thyagarajan *et al.*^[9] Mosley and White in 1975 also reported that longer the individual comes in contact with infected patients, greater is the risk of acquiring infection.^[10] In both the studies, HBsAg positivity was seen predominantly in periodontists. This could be attributed to the fact that periodontists come in close contact with gingival crevicular fluid, the area of greatest concentration of the virus.^[5] It is a well-known fact that the flow rate and the amount of gingival crevicular fluid getting into saliva is more pronounced in gingivitis and periodontitis. This could account for the presence of HBsAg in saliva of infected patients and could have been a route of transmission of the virus to the periodontists from infected patients. The Council of Dental Therapeutics also has reported that oral surgeons and periodontists are at a high risk of acquiring the disease because of their exposure to blood.^[11] Withers also reported higher rate of clinical hepatitis (13.9%) as compared to general dentists (3.2%).^[12]

In our study, most of the dental professionals showing HBsAg positive status had reported needle-stick injury in their tenure of dental practice. This also could have been a route of transmission from infected patients.^[1] In both the studies, proportion of affected males was higher and was in concurrence with the study done by Blumberg *et al.*, in 1972 who reported male predilection.^[13]

With regards to barrier system; in 1991, 12% of dental professionals used gloves and 49% of dental professionals used face mask and none of them used disposable needles; whereas in 2012, all the dental professionals used face mask, gloves and disposable needles. This could be attributed to an increase in awareness among dental professionals. In 1991, vaccination to HBV was not considered important. In 2012 all the dental professionals gave history of hepatitis B vaccination. However, dental professionals with low antibody titer showed presence of HBsAg. This indicates the importance of hepatitis B vaccination and periodic evaluation of antibody titer for booster dose administration.^[14]

In our study we have observed a decrease in prevalence of HBsAg after a gap of 10 years. Though it appears to be a good sign, the disease has not been eradicated. It is important for every dental professional to administer vaccination; periodically monitor antibody titer as well as take proper

measures after needle-stick injury, as even if one dental professional is infected it could be life-threatening for him/her and has the risk of transmission to his/her family members and patients.

CONCLUSION

Despite advancements in barrier methods to protect both the operator and patient in the dental office, mankind still suffers the scourge of transmissible diseases like hepatitis B. Our study sheds light on the need for protocols to protect dental surgeons in case of mishaps like needle-stick injury and also highlights the importance of vaccination against hepatitis.

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