SERO-PREVALENCE OF HEPATITIS B INFECTION AMONG DENTAL PROFESSIONALS

M Vadivale, T C Tan, C N Ong

ABSTRACT

Dental employees in government institutions in a State in Peninsular Malaysia were screened for exposure to hepatitis B virus (HBV) in 1989. Almost all (96.8%) of the 217 employees responded. One quarter (24.8%) was positive for at least one serological markers to HBV; 2.4% had hepatitis B surface antigen (HBsAg) and 22.4% had anti-body to HBsAg (anti-HBs). The presence of HBsAg was unrelated to age, sex, ethnicity, geographical locality and occupations of the subjects. The prevalence of anti-HBs increased with age and was highest for ethnic Chinese (53.6%), followed by Indians (25%), compared to Malays (14.9%) ($p<0.001$) and were increased among dentists (53.1%) and assistant nurses (33.3%). The overall prevalence of HBsAg and anti-HBs were similar to the situation in the community. However, dentists and their chairside assistant nurses, with a higher proportion of Chinese, had higher anti-HBs prevalences compared with that of the general population.

Keywords: anti-HBs, dental, HBsAg, hepatitis B, Malaysia, occupational, risk factors.

SINGAPORE MED J 1992; Vol 33: 367-369

INTRODUCTION

Hepatitis B virus infection has a world-wide distribution[1] and the global problem of hepatitis B virus (HBV) infection has long been recognised by World Health Organisation[2]. The prevalence of HBV infection among communities varies greatly and has been associated with geographical factors as well as a complex mix of behavioural, environmental and host factors[3]. A recent detailed review described the situation of sero-epidemiology of hepatitis B (and A) in the Asia Pacific region[4] covering various population groups including blood donors, hospital patients, prisoners, rural villagers, aborigines, children, students, migrants and pregnant women. At the same time, immunisation programmes against HBV have already been initiated in several Asian countries including Korea, China, Hong Kong, Thailand, Taiwan, Singapore[1] and lately in 1989 in Malaysia.

HBV infection in dental professionals have been reported to be higher than the general populations among Caucasian populations in the West[5-10], Australia[11], New Zealand[12] and in Asia[13,14] where the disease is endemic.

This study describes a HBV screening programme among dental staff in a State in Peninsular Malaysia when hepatitis B immunisation was introduced in 1989. Among the main groups identified for screening and immunisation were certain high-risk categories of dental and medical employees, all new borns and children below 5 who were in contact with carriers[15].

Ministry of Health
70590 Seremban
Negri Sembilan Darul Khusus
Malaysia

M Vadivale, MBBS, MSc (OM)
Medical Officer of Health

Department of Community, Occupational & Family Medicine
National University of Singapore
National University Hospital
Lower Kent Ridge Road
Singapore 0511

T C Tan, MBBS, MSc (OM), MFOM (Lond), FACOM, FAMS.
Senior Lecturer

C N Ong, PhD
Associate Professor

Correspondence to : Dr T C Tan

MATERIALS AND METHODS

Subjects and methods

Hepatitis B immunisation was offered to dental employees of the Ministry of Health in 1989 in Peninsular Malaysia. A screening programme for serological markers to hepatitis B virus was first conducted. Blood samples were analysed in the Govemment's Central Laboratory under the supervision of the State Pathologist. Hepatitis B surface antigen (HBsAg) was analysed using the AUSAB EIA method and antibody to HBsAg (anti-HBs) with the AUSZYME monoclonal ELISA method (Abbott's). Personal particulars and service information of individual staff were obtained from service records provided by the Ministry of Health.

Statistical Analysis

Blood results and information of respondents were coded and formatted in Dbase 3 and Lotus programme. The proportions of subjects with HBV serological markers were analysed by sex, age, ethnicity, occupation and locality of work. Estimates of relative risks were calculated by selected factors between occupational groups. Chi-square tests were applied for comparing proportions between groups and the Students' t-tests for comparing mean values between groups with the Epistat programme.

RESULTS

There was 217 employees in the State Dental Service and 96.8% (210) responded to the screening programme. Table I shows the characteristics of the respondents. About three-quarters (78.6%) of the respondents were female. The mean age was 35.0 years (SD 6.9) with little difference between males (38.9, SD 7.7) and females (36.0, SD 6.4). Malay was the largest ethnic group (63.8%), followed by Indian (22.9%) and Chinese (13.3%). Compared to the general population in Malaysia, Malays were over-represented and Chinese were under represented in the dental profession. There was little age difference between the three ethnic groups: the mean age for Malay was 36.5 years (SD 6.8), 37.1 years (SD 7.1) for Indian and 38.4 years (SD 7.3) for Chinese.

The overall prevalence of serological markers for HBV was 24.8%; 2.4% had HBsAg and 22.4% had anti-HBs (Table

I). The presence of HBsAg among subjects was not related with age, sex, ethnicity and locality. Subjects in the older age groups showed increased prevalence of anti-HBs, with 30% in the 40-49 age group and 71.4% in the 50-59 age group when compared to the younger groups ($p< 0.004$). Ethnic Chinese had the highest prevalence for anti-HBs (53.6%), followed by Indians (25%) compared with Malays (14.9%) ($p< 0.001$).

Table I - Distribution of HBV serological markers among employees by selected variables

	No. of subject(%)	Proportion found positive (%) for HBsAg	anti-HBs	Both markers
Age(years)				
20-29	55(26.2%)	5.5	18.2	23.7
30-39	98(46.7%)	1.0	17.3	18.3
40-49	50(23.8%)	2.0 NS	30.0 p<0.004	32.0 p<0.008
50-59	7 (3.3%)	0	71.4	71.4
Sex				
Male	45(21.4%)	4.4	17.8	22.2
Female	165(78.6%)	1.8 NS	23.6 NS	25.4 NS
Race				
Malay	134(63.8%)	2.2	14.9	17.1
Chinese	28(13.3%)	3.6 NS	53.6 p<0.001	57.2 p<0.001
Indian	48(22.9%)	2.1	25	27.1
Locality				
Urban	100(47.6%)	2.0	19.0	21.0
Rural	110(52.4%)	2.7 NS	25.5 NS	28.2 NS
All subjects	210(100%)	2.4	22.4	24.8

Table II shows the distribution of HBV serological markers by the main occupations. Using dental attendants, who were mainly ethnic Malays and not involved with dental procedures, as the reference group, the prevalence of HBsAg was increased among staff nurses (4.8%) with increased relative risk of 1.83 (95% CI: 0.24, 649) but was not statistically significant. However, the prevalence and relative risks for anti-HBs were increased among the dentists (53.1%, RR=10.85, 95% CI: 3.44, 35.54) and assistant nurses (33.3%, RR=4.79, 95% CI: 1.59, 14.87) when compared with attendants.

DISCUSSION

The overall prevalence of serological markers to HBV among dental employees was similar to that found in the local community where the prevalence has been reported as 2 to 8% for HBsAg and 20-25% for anti-HBs[4,16-20]. Earlier studies in the West, Singapore and Thailand have shown no overall increase in serological markers among dental workers when compared with their respective general populations[8-14].

There was no definite relationship of HBsAg prevalence with age in our study but the prevalence of anti-HBs among dental staff increased with age as in earlier studies[12,21]. This pattern resembled the occurrence in the Malaysian community where infection was noted to be highest in the first and second decades of life[16,19] and the mean age of infection being 15 years[20]. Two major patterns of HBV infection have been recognised[3,22]. In high prevalence areas, as in the case of Malaysia, infection is acquired early in life and the carrier rate decline or remain the same with age. In low prevalence areas, however most infection are found among high risk groups of individuals where there is increased contact with blood and blood products, intravenous drug users and promiscuous homosexuals.

The overall prevalence of serological markers to HBV in dental staff in this study was significantly higher than in all studies but one in the West[8-12], Singapore[13] and Thailand[14] (24.8% compared to 7.2% -16.8% with p values from 0.0001 to 0.007). Significant difference was found for prevalences between anti-HBs (22.4% compared to 6% - 16% with p values from 0.0001 to 0.0310) but not for prevalences between HBsAg (2.4% compared to 0.5% -1.0%).

The importance of birthplace, together with the ethnicity, and occupation have been incriminated to have independent effect of developing HBV markers[23]. The findings of the present study confirm the results in several earlier studies that there is an increase of anti-HBs related to the male sex[13,19,22], place of birth[23] and especially of the Chinese stock[16,17,22]. The vulnerability of the Chinese to HBV infection found in this study and several population based studies in Malaysia[4,13,16-20] have been explained as a genetical predisposition to antigenic persistence[24]. The occupations found to be at risk were similar to earlier studies[25] and included dentists by Cottone[26] and Siew[27] , and assistant nurses[5,10,12]. The increased risk among certain occupations have been attributed to the degree of exposure to blood and blood products and needlestick injuries rather than with patient-handling[26-30].

The findings of this study suggest that although the overall prevalence to HBV infection among all categories of dental workers is low in a geographical area where HBV infection is endemic, the risk among dentists and chairside nurses are increased. This is compounded by the fact that there was larger proportion of Chinese among dentists and their chairside assistants. The high prevalence of HBV infection among dental professionals has been explained by dual effect of exposure to the endemic community and the added contact with infected individuals at work[31].

It is however important to note that most of the information in the study is obtained from service data. Screening for HBeAg as a measure for infectivity status was not conducted in this survey. Gaps of information found to be important but unavailable in this study include duration of employment, previous occupational history, needlestick injury, past hepatitis

Table II - Seroprevalence and relative risk of HBV markers by occupations

Occupation	No. of subject	HBsAG %positive	HBsAG RR (95% CI)	anti-HBs %positive	anti-HBs RR (95% CI)	
Attendant	74	2.7	1	9.5	1	
Asst. nurse	42	0	-	33.3	4.8	(1.6-14.9)
Staff nurse	62	4.8	1.8(0.2-14.7)	14.5	1.6	(0.5- 5.2)
Dentist	32	0	-	53.1	10.9	(3.4-35.5)
All occupations	210	2.4		22.4		

infection and blood transfusion[32]. At the time of writing, the results of the vaccination of sero-negative subjects and sero-conversion information were not available for this report. The findings from another related study[33] revealed that 78% of dentists were aware of the high risk involved. However, 71% recalled having received needlestick injuries but only 32% were vaccinated, 41% intending to and 15% refusing vaccination. There is a need to disseminate health education on HBV[11,33] and careful work practices among dentists in Malaysia.

ACKNOWLEDGEMENTS

The authors would like to thank the Director and Deputy Director of Health and Medical Services of Negri Sembilan State for their permission to use the information for this study and to the Senior Medical Laboratory Technologist of the Blood Bank of Seremban General Hospital for his assistance.

REREFENCES

1. WHO. Hepatitis B immunisation strategies - Expanded programme of immunisation. World Health Organisation, Geneva 1988. Document No. (WHO/EPI/GEN/88.5).
2. WHO. Viral Hepatitis. World Health Organisation, Geneva 1975. (WHO tech. rep. ser. no. 570, 5-51).
3. WHO. Hepatitis. World Health Forum 1983; 4: 135-40.
4. Brown P. The seroepidemiology of hepatitis A and B in the Asia-Pacific region. Asia Pacific J Publ Hlth 1987; 1: 62-78.
5. WHO. Advances in viral hepatitis. World Health Organisation, Geneva 1977. (WHO tech. rep. ser. no. 602, 20 62).
6. Maynard JE. Viral hepatitis as an occupational hazard in the health care profession. In: Vyas GN, Cohen SN, Schmid R.eds. Viral hepatitis. Philadelphia: Franklin Institute Press 1978: 321-31.
7. Scarlett MI. Infection control in dentistry. J Am Stud Dent Assoc 1987; 7: 24-8.
8. Scheutz F, Melbye M, Esteban JI et al. Hepatitis B virus infection in Danish dentists. A case-control and follow-up study. Am J Epidemiol 1988; 128: 190-6.
9. Iserson KV, Criss EA, Wright AL. Hepatitis B and vaccination in emergency physicians. Am J Emergen Med 1987; 5: 227-31.
10. Smith CE. A study of the prevalence of markers of hepatitis B infection in hospital staff. J Hosp Infect 1987; 9: 39-42.
11. Amerena V, Andrew JH. The risk to Australian dentists and dental health care workers. Aust Dent J 1987; 32: 183-9.
12. de Liefde B, Miller JA, Salmond CE. Prevalence of hepatitis B among school dental nurses. NZ Med J 1987; 100: 545-7.
13. Goh KT, Chan YW, Wong LYM et al. The prevalence of hepatitis B virus markers in Dental personnel in Singapore. Trans R Soc Trop Med Hyg 1988; 82: 908-10.
14. Itharatana K. Viral hepatitis B infection. Transmission and prevention for dentists. J Dent Assoc Thai 1988; 38: 180-7.
15. Ministry of Health. Kementerian Kasihatan Malaysia. Plan of action for hepatitis B immunisation programme for health staff. Bahagian Perkhidmatan Perubatan, September, 1988.
16. Lopez CG, Duraisamy G, Govindasamy S. Prevalence of hepatitis B infection as determined by third generation tests in Malaysian populations. Malaysian J Pathol 1978; 1: 91-5.
17. Lopez CG. Epidemiology of persistent hepatitis B infection. Malaysian J Pathol 1985; 1: 7-10.
18. Wing DNW. Hepatitis risk in the hospital. Malaysian J Med Lab Sciences 1986; 3: 15-7.
19. Ross IN, Dass PK, Thavarasah AS et al. Epidemiological features of hepatitis B in Malaysia. Med J Malaysia 1988; 43: 278-83.
20. How VJL. Introduction of hepatitis B virus and HBV infection. Malaysian J Med Lab Sciences 1986; 3: 11-2.
21. Hovig B, Rollag H, Dahl O. Antibody to hepatitis B surface antigen among employees in the National Hospital, Oslo, Norway. A prevalence study. Am J Epidemiol 1985; 122: 127-34.
22. Sobeslavsky O. Hepatitis B virus as a global problem. In: Vyas NG, Stephen NC, Schmid R. eds. Viral hepatitis. Philadelphia: Franklin Institute Press 1978: 347-55.
23. King SM, Jarvis DA, Shaw J, Shannon HS. Prevalence of hepatitis B surface antigen and antibody in personnel at a children's hospital. Am J Epidemiol 1987;126: 480-3.
24. Szmuness W, Much MI, Prince AM et al. On the role of sexual behaviour in the spread of hepatitis B infection. Ann Intern Med 1975; 83: 489-95.
25. ACIP. Recommendations for protection against viral hepatitis. MMWR 1985; 34: 313-35.
26. Cottone JA. Hepatitis B virus infection in dental profession. Hepatitis Symposium. JADA 1985;110: 617-21.
27. Siew C, Gruninger SE, Hojvat SA. Screening dentists for HIV and Hepatitis. N Engl J Med 1988; 318: 1400-1.
28. Goubran GF, Cullens H, Zuckerman AJ et al. Hepatitis B virus infection in dental surgical practice. Br Med J 1976; 2: 559-60.
29. Syndman DR, Munoz A, Werner BG et al. A multivariate analysis of risk factors for hepatitis B virus infection among hospital employees screened for vaccination. Am J Epidemiol 1984; 120: 684-93.
30. Nelson KE. Prevention of hepatitis in health care workers. Occupational Medicine: State of the Art. Reviews 1987; 2: 451-70.
31. Antoniello S, Auletta M, Cerini R et al. Hepatitis B virus infection among health care workers at an urban teaching hospital in South Italy: a low occupational hazard ? Eur J Epidemiol 1989; 5: 228-33.
32. Solvas JG, Casillo JL, Vela MCM et al. The risk of infection with hepatitis B virus in relation to length of hospital employment J Hosp Infect 1987; 9: 43-7.
33. Yaacob HB, Samaranayake LP. Awareness and acceptance of the hepatitis vaccine by dental practitioners in Malaysia. J Oral Pathol Med 1989; 18:236-9.