Hepatitis B Virus Markers in Dental Care Personnel Practising in Harare

SA TSWANA, C BEREJENA

SUMMARY

In a seroepidemiologic study of 600 volunteers the authors detected serologic markers of hepatitis B surface antigen (HBs Ag) in 6 (6%) of the 100 dental-care markers representing a spectrum exposure to blood and patients. However, 67 (67%) and 1 (1%) were positive for hepatitis B surface antibody (anti-HBs) and hepatitis Be antigen (HBe Ag) respectively. Two (8%) of the 25 practising dentists were found to be asymptomatic carriers of HBs Ag. One of these HBs Ag positive dental-care workers was HBe Ag positive. The seropositivity of HBs Ag, HBe Ag and anti-HBs among the general population of 500 was 47 (9.4%); 15 (3.0%) and 350 (70%), respectively. It was, therefore, concluded that there was no significant difference (p < 0.001) of HBs Ag or anti-HBs between dental care workers and the general population.

However, when the study group was subdivided into two ethnic groups, thus, Caucasian Zimbabwean and African Zimbabwean, the latter had a high prevalence (9.90%; 2.77%; 71.29%) of HBs Ag, HBe Ag and anti-HBs respectively.

INTRODUCTION

Infection by hepatitis B virus (HBV) is a well recognised occupational risk of dental and medical health professionals. These professional personnel providing health care have long suspected that they have a greater than average risk of viral hepatitis, Trumbel, Greiner1 and Byrne2 have been highly concerned about it.

The risk of hepatitis B virus infection to dental-care personnel, however, is underestimated by clinical attack rates but reflected more...
accurately in several surveys of serological markers of infection. Many epidemiological reports have supported the phenomenon that certain occupational groups have an increased risk of contracting acute type B hepatitis infection. Therefore, among health-care workers, dentists have long represented a special problem in this respect. The increasing inconvenience and potential cost of an acute illness that usually causes absence from work for four to six weeks is an obvious worry. In the past the focus of anxiety was based on the relative remote possibilities of death from a fulminant course, or probably long-term disability from chronic hepatitis B virus infection, whether clinical or sub-clinical, will result in the carrier state. Unfortunately, this concern is more appropriate.

Since there have been no studies of HBV infection among dental personnel in Zimbabwe which experiences a high prevalence in the general population, this study was undertaken to measure the presence of HBs Ag, HBe Ag and anti-HBs in dental-care personnel, and to subsequently expose the dangers and risks of the disease.

MATERIALS AND METHODS

Study population

The study was confined to dentists who practise in Harare. Dental personnel from Parirenyatwa Hospital, Union Avenue and 5th Street, Medical Centre, Anlaby House and several other dental settings were included in the study.

Although the country has a low number of professional dentists, Harare has probably the highest ratio in the country. Dentists see many patients per week who visit them for various reasons of dental care, such as extraction, fillings, cleaning, denture services, crown and bridging etc. As a result the dental-care health workers have daily contacts with patients' saliva or blood.

All dental-care personnel, that is, dentists, dental assistants, receptionists, cleaners and dental students were included in the study. The study consisted of 100 volunteers in which there were 25 professional dentists, 34 dental assistants and 41 general dental workers, classified as others in this study. Their ages ranged from 18 to 66 years with a mean of 28. Five hundred volunteers, mainly those who are not at risk with the virus were included in the study. Of the 500 general population volunteers, 50 were Caucasian Zimbabweans and 450 African Zimbabweans. The term 'general population' in this study is defined as those individuals who were not associated with dental-care practice. This group was, therefore, used to compare the rate of HBV markers in dental-care practice.

Furthermore, the study group was sub-divided into Caucasian and African Zimbabweans. All these individuals were working in the dental-care units. Of the 39 Caucasians, there were 18 dentists, 21 dental assistants and 7 general dental workers, whereas out of the 61 African Zimbabweans, there were only 6 dentists, 13 dental assistants and 35 general dental workers. 'General dental workers' in this study includes receptionists, cleaners and clerks who give services to dental-care units.

Procedures

Samples of 5 ml venous blood were collected into 10 ml test tubes and were immediately transported to the laboratory for serum separation. In the laboratory the test tubes containing blood were centrifuged at 2 000 x G for 15 minutes. Sera were separated into 3 ml sterile vials and were stored at -2 °C if not examined on the same day.

Sera samples were serologically tested for the presence of HBV markers by the Ortho Enzyme-linked Immunosorbent Assay (ELISA) for the detection of HBs Ag. For detection of HBe Ag, and anti-HBs ELISA kits from Abbot Laboratories were used. The procedures followed were those by the manufacturers, with minor modifications to suit our laboratory conditions, and each sample was done twice for accuracy, and reproducibility. Sera and reagents were allowed to sit at room temperature for at least 15 minutes before the sera were tested. Results were visually interpreted, because colour developed only in positive wells.

Statistical analysis

Statistical analyses were performed by using the Fisher 2 tailed probability. A difference was considered significant when p ≥ 1.
RESULTS

Of the 600 tested volunteers 53 (8.8%), 417 (69.5%) and 16 (2.7%) were positive for HBs Ag, Anti-HBs and HBe Ag, respectively (Table I). Twelve (8%) of the 25 dentists were positive for the surface antigen, and 1 (2.9%) of the dental assistants was HBs Ag positive. Among the general dental workers 3 (7.3%) had HBs Ag in their sera, while 47 (9.4%) of the general population was positive for the same markers.

TABLE I - Relationship between HBs Ag, Anti-HBs and HBe Ag among the dental-care personnel

<table>
<thead>
<tr>
<th>Category</th>
<th>N Examined</th>
<th>HBsAg</th>
<th>Anti-HBs</th>
<th>HBe Ag</th>
</tr>
</thead>
<tbody>
<tr>
<td>General population</td>
<td>500</td>
<td>47 (9.4)</td>
<td>350 (70)</td>
<td>15 (3.0)</td>
</tr>
<tr>
<td>Dentists</td>
<td>25</td>
<td>2 (8.0)</td>
<td>20 (80)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Dental assistants</td>
<td>34</td>
<td>1 (2.9)</td>
<td>18 (52.9)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Others*</td>
<td>41</td>
<td>3 (7.3)</td>
<td>29 (70.7)</td>
<td>1 (2.4)</td>
</tr>
<tr>
<td>Total</td>
<td>600</td>
<td>53 (8.8)</td>
<td>417 (69.5)</td>
<td>16 (2.7)</td>
</tr>
</tbody>
</table>

*Receptionists, cleaners and clerks

The seropositivity for HBe Ag was detected in 15 (3.0%) of the general population and in 1 (1%) of dental care workers. Interestingly, HBe Ag was not detected in either dentists or dental assistants.

The prevalence of Anti-HBs in the general population, dentists, dental assistants and general dental workers was 70%, 80%, 52% and 70.7%, respectively. But it was found that the prevalence of HBs Ag, HBe Ag and Anti-HBs in Caucasians was 3.16%, 1.05% and 60% respectively, whereas in African Zimbabweans, seropositivity for either HBs Ag, HBe Ag and Anti-HBs was 9.90%, 2.77% and 71.29% respectively, (Table II).

DISCUSSION

This study distinctly documents a low prevalence (6%) of HBs Ag carriers among dental-care workers in Harare compared to the prevalence of 9.4% among the general population from the same city. However, there was no statistical significant difference (p < 0.001) between the prevalence of HBs Ag carriers among professional dentists and the general population.

Studies elsewhere, such as Smith et al. and Trumbell and Greiner clearly demonstrate higher prevalence of HBs Ag among dentists than in the general population. However, their findings are incompatible with ours. This could probably be explained by a small sample of volunteers from the dental profession or by the fact that some dentists could have received the HBs Ag vaccine during their practice and might have cleared HBs Ag.

Interestingly, when the study group was subdivided into two ethnic groups, Caucasian and African Zimbabweans, the latter had a higher prevalence of all the viral markers tested (Table II). Therefore, the prevalence of HBs Ag among African Zimbabwean dentists was compatible with studies elsewhere. The higher prevalence of

TABLE II - Relationship of HBs Ag, Anti-HBs and HBe Ag among the Caucasian and African Zimbabwean dental-care personnel

<table>
<thead>
<tr>
<th>Category</th>
<th>N Examined</th>
<th>HBsAg</th>
<th>Anti-HBs</th>
<th>HBe Ag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C  A</td>
<td>C  A</td>
<td>C  A</td>
<td>C  A</td>
</tr>
<tr>
<td>General population</td>
<td>50 450</td>
<td>2 (4)</td>
<td>45 (10)</td>
<td>29 (58)</td>
</tr>
<tr>
<td>Dentists</td>
<td>18 7</td>
<td>1 (5.6)</td>
<td>1 (14.3)</td>
<td>14 (77.78)</td>
</tr>
<tr>
<td>Dental assistants</td>
<td>21 13</td>
<td>0 (0)</td>
<td>1 (7.7)</td>
<td>10 (47.62)</td>
</tr>
<tr>
<td>Others</td>
<td>6 35</td>
<td>0 (0)</td>
<td>3 (8.6)</td>
<td>4 (66.67)</td>
</tr>
<tr>
<td>Total</td>
<td>95 505</td>
<td>3 (3.16)</td>
<td>50 (9.90)</td>
<td>57 (60)</td>
</tr>
</tbody>
</table>

C = Caucasian      A = African

238
HBs Ag, 1 (14.3%) among the African Zimbabwean dentists clearly demonstrates that certain ethnic groups are at risk. However, the prevalence of HBs Ag in the African Zimbabwean is comparable with our previous study. The reason for the African Zimbabwean dentists having a higher prevalence could probably be best explained by socio-economic status, or by vertical transmission of the virus.

The prevalence of Anti-HBs was found to be generally high among all sampled individuals. This was in fact comparable with several findings that show a significantly higher rate of Anti-HBs seropositivity. In all categories, a higher prevalence of Anti-HBs was found in African Zimbabwean dental-care personnel (Table II). As indicated in the study, the high rate of Anti-HBs positive could probably be a result of individuals being exposed or coming in contact with the wild virus. Although special care could be employed in dental-care practice, the probability of either the dental-care worker or the patient contracting hepatitis is certainly high. According to Barker et al., transmission of the viral particle by serum requires only 0.001 ml of the inoculum. Apparently, the potential biologic infectivity of the HBs Ag positive individual is related to the presence of several markers in the blood i.e. the Dane particles, DNA polymerase and HBs Ag. It should be noted, however, that positivity of HBe Ag correlates strongly with the number of Dane particles in the serum with DNA polymerase levels, and HBe Ag positive serum may be as many as $10^8$ times more infective than HBe Ag negative serum.

By nature of their close contact with blood products, saliva and abrasive surfaces, dentists are at a particular risk of acquiring viral hepatitis, especially in an area of high-risk carrier state. But transmission of HBV from dental-care workers to patients or patients to dentists could be prevented by an awareness of the risk of hepatitis, good personal hygiene, effective disinfection and sterilization and simply by the wearing of gloves.

Since it is costly to screen every dental patient before any work is performed on the individual, it would be more suitable and appropriate for dentists and their assistants to be vaccinated against hepatitis B virus. Active-passive prophylaxis with the plasma-derived hepatitis B vaccine and hepatitis B immuno-globulin has been shown to reduce the incidence of development of the chronic hepatitis B surface antigen carrier state in infants born to HBs Ag-positive hepatitis Be Ag-positive women, with a protective efficacy of 85–95 per cent. Another vaccine, a yeast-derived recombinant hepatitis B vaccine is now on the market. Several studies have shown that this vaccine is safe, immunogenic and effective.

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REFERENCES


