

Hepatitis B and C in doctors and dentists in Nigeria

I.O. OLUBUYIDE, S.O. OLA, B. ALIYU, O.O. DOSUMU¹, J.T. AROTIBA²,
O.A. OLALEYE³, G.N. ODAIBO³, S.O. ODEMUYIWA³ and F. OLAWUYI⁴

From Departments of Medicine, ¹Restorative Dentistry, and ²Oral & Maxillofacial Surgery, ³Virus Research Laboratory, and ⁴Biomedical Statistics Unit, (Department of Preventive & Social Medicine), University College Hospital, Ibadan, Nigeria

Received 18 February 1997

Summary

We surveyed a random sample ($n=75$) of doctors and dentists at University College Hospital, Ibadan, Nigeria. They were offered anonymous testing for hepatitis B surface antigen (HBsAg), hepatitis Be antigen (HBeAG), antibodies to hepatitis B core antigen (anti-HBc) and to hepatitis C virus (anti-HCV), by enzyme immunoassay. The results suggest a high prevalence of hepatitis B virus (HBV) with a high potential of transmissibility, as well as a high prevalence of HCV infection. The majority of the doctors and dentists use universal precaution for protection against viral hepatitis on <50% of the occasions when they carry out procedures on their patients. Infection with HBV was associated with type of specialty (surgeons, dentists) and lack of

HBV vaccination ($p<0.05$). After logistic regression, these factors were independently associated with HBV infection ($p<0.05$). Sixty (80%) had not received prior HBV vaccination. Unvaccinated personnel were more likely to be surgeons, dentists, <37 years of age, and have fewer years of professional activity ($p<0.05$). After logistic regression, only fewer years of professional activity remained independently associated with lack of vaccination ($p<0.05$). To reduce the occupational exposure of HBV, universal precautions must be rigorously adhered to when the doctors and dentists carry out procedures on their patients, and all health-care workers should be vaccinated with HBV vaccine and the HCV vaccine, when it becomes available.

Introduction

Health-care workers (HCWs) are at increased risk of occupational acquisition of HBV infection.¹ In addition, HCV is a newly-recognized cause of parenterally-acquired hepatitis, and the prevalence of this virus in HCWs is unclear. Viruses may be deposited in needles and syringes, and may be transmitted to HCWs by accidental injury. In a recent survey of resident doctors in Nigeria, 93% had had one or more accidental exposures to blood and body fluids of their patients over a one-year period.² Almost all dentists state that puncture of the skin of the fingers occurs once or more each week. Drilling, with its attendant spray, also creates a potentially infectious aerosol. The inconvenience and potential costs of an acute illness that usually causes absence from work for 4 to 6 weeks has been and remains an obvious worry among HCWs.³ The greatest fear is that HBV⁴ or HCV infection, whether clinical or

subclinical, may result in the carrier state or long-term disability from chronic liver disease.⁴

Recognizing that doctors and dentists are amongst the most highly exposed groups of HCWs, and in view of their concern for the risk of acquiring these viruses,⁴ we determined the seroprevalence and the epidemiological characteristics of the viruses among a sample of these workers at the University College Hospital, Ibadan, Nigeria. No recent study exclusively addresses this problem in HCWs in tropical Africa.

Methods

Sample

All the doctors and dentists in the hospital were eligible for the study. Several pre-study contacts were established to explain the goal of the survey. Such

Address correspondence to Dr I.O. Olubuyide, 163 Hazelbank Road, Catford, London SE6 1LU

© Oxford University Press 1997

contacts were immediately after academic meetings in their departments and they were asked to complete a questionnaire and offered anonymous testing for HBV and HCV. Participation was voluntary and the participants were healthy without symptoms of acute illness. Moreover, they were in active practice of their profession in the hospital. The study took place between November and December 1995.

Variables

The following information was requested from the doctors and dentists: age, sex, type of practice, number of years between graduation from medical or dental school and participation in the survey, history of previous blood transfusion, history of homosexual practices, previous history of viral hepatitis in the participant as diagnosed at the Staff Medical Services Department, previous history of viral hepatitis in household or office contacts, history of exposure to patients with viral hepatitis, proportion of patients recognized or strongly suspected of illicit self-injection in the practice, use of illicit drugs by the participant, percentage of procedure carried out on patients during which universal precaution was used and history of previous hepatitis B immunization.

Controls

In the same period of study, controls were consecutive first-time local unpaid blood donors. A sample of blood was taken from them to test for HBV and HCV during blood donation.

Each HCW and control donated 10 ml blood in a plain tube from which sera were analysed for HBsAg, HBeAg from HBV⁺ sera, and HBcAb using commercially-available enzyme immunoassay kits (Murex Diagnostics). Three aliquots, each of 200 µl, were stored at -70 °C for analysis of markers of HCV infection using a third-generation enzyme immunoassay method (Murex Diagnostics).

Confidentiality was maintained by numeric coding of serum samples and questionnaires. Test codes were given to participants so that they could anonymously obtain a report of their testing which was enclosed in a sealed envelope. The report forms included test results, explanations of their meaning and an offer for consultation for those testing positive.

Statistical analysis

Univariate analysis was used, and included calculation of odd ratios for HBV by each variable of interest such as age, sex, type of practice, vaccination status, total number of years of professional practice, history of blood transfusion. The χ^2 test, supplemented by Fisher's test if required by sample size,

was used to assess the significance of differences. All available information on each variable was used. Age and total number of professional years were analysed as continuous variables in the model by grouping the data. A multiple logistic regression model was built using these variables that were found to be both significant by univariate analysis and potentially meaningful confounders of association. The purpose of the model was to determine which characteristics of the doctors and dentists were independently associated with HBV infection. The same procedure using the above variables was used to determine which characteristics were independently associated with lack of hepatitis B vaccination. A *p* value of 0.05 or less indicated statistical significance.

Results

Seventy-five doctors and dentists participated in the study. Complete results from questionnaires and serology were available for analysis on all of them. They constituted 42% of all the doctors and 100% of all the dentists in the specialties being examined. The median age and total years of clinical and dental activity of study participants were 34.2 ± 5.6 and 9.5 ± 1.7 years, respectively. The number of female doctors and dentists was 22 (29%). Table 1 shows the distribution of participants by type of specialty and department. Doctors constituted 70% of our sample.

The breakdown of the sample by age, sex and years of professional activity was similar to that of the other medical and dental staff of the hospital. The study population was therefore representative of the medical and dental staff population in the hospital.

Table 1 Occupation and departments of participating doctors and dentists at the University College Hospital, Ibadan, Nigeria

<i>Occupation</i>	
Physicians	28 (37)
Surgeons	25 (33)
Dentists	22 (30)
<i>Department</i>	
Medicine	15 (20)
Paediatrics	13 (17)
Surgery	15 (20)
Obstetrics & Gynaecology	10 (13)
Dentistry	22 (30)

Physicians are the doctors from the departments of Medicine and Paediatrics. Surgeons are the doctors from the departments of Surgery and Obstetrics & Gynaecology. Data are numbers (percentages).

Of the doctors and dentists, 64% estimated they never treated any patients suspected of illicit self-injection. Another 34% estimated that 1% of their patients were strongly suspected of illicit self-injection. No difference was noted between HBV⁺ and HBV⁻ subjects. None of the doctors and dentists said that they used illicit drugs or practiced homosexuality.

There was a high frequency (93%) of asymptomatic infection with HBV in the HCWs who were HBV⁺. Anti-HBc, which indicates past HBV infection, as detected in nine HCWs (12%) compared with four (16%) of the local blood donors. HBsAg, which indicates active infection was detected in 10/22 (45%) dentists, compared to 19/53 (35.8%) doctors ($p < 0.05$) and 5/25 (20%) local blood donors ($p < 0.01$). HBeAg was present in 4/19 and 6/10 HBsAg⁺ doctors and dentists, respectively ($p < 0.05$).

Twenty-six (90%) of the 29 HBV⁺ and 21 (46%) of 46 HBV⁻ HCWs ($p < 0.02$) failed to use universal precautions for protection against hepatitis on <50% of the occasions when they carry out procedures on their patients.

Lack of HBV vaccination and type of specialty were risk factors in the individuals who were HBV⁺ (Table 2). After multivariate analysis using logistic regression, lack of vaccination and specialty were independently associated with past HBV infection.

Sixty (80%) of the doctors and dentists had not received prior HBV vaccination before participation in the survey (Table 3). Non-vaccinated HCWs were more likely to be surgeons, dentists, <37 years of age and have fewer years of professional activity. After logistic regression, only fewer years of professional activity remained independently associated with lack of vaccination.

Anti-HCV antibodies were confirmed in 8/75 (11%) HCWs compared with 12% of 25 local blood donors (NS). The number of anti-HCV⁺ HCWs was too small to determine any differences between anti-HCV⁺ and anti-HCV⁻ doctors and dentists for the items examined for HBV⁺ above.

Discussion

This is a first investigation into the prevalence of HBV and HCV infection, and the epidemiological characteristics of HBV among doctors and dentists in tropical Africa. The subjects were highly exposed to blood and blood products. Therefore the results may not be strictly applicable to medical and dental students, nurses, or laboratory scientists, although the nurses are even more closely involved in the care of individual patients, and are also subject to percutaneous exposures. Nevertheless, the study has limitations. Enrolment could not be offered to all the

doctors for to logistic reasons, and this could have introduced the potential for bias. Those who have had accidental exposures or viral hepatitis previously would probably be more willing volunteers. Conversely, those sufficiently concerned to complete the questionnaire may have conscientiously avoided exposures to blood and body fluids of their patients.

We have shown that for HBsAg positivity, the 39% frequency among our doctors and dentists is substantially above the 20% among the first-time unpaid blood donors ($p < 0.05$), the latter being similar to that reported in a similar environment in Africa.⁵ The doctors and dentists therefore do appear to have a higher carrier rate than the unpaid blood donors. The two investigations used enzyme immunoassays and are therefore comparable. HBeAg was present in 10 (34%) HBsAg⁺ subjects, revealing a high potential of infectivity, particularly among the dentists. Based on our results, we can conclude that these HCWs have a high prevalence of HBV infection with a high potential of transmissibility. Notably, almost all were either free of symptoms, or have diseases that have not yet been diagnosed. No previous study in Nigeria has examined subclinical HBV infection or overt hepatitis in other professions.

History of blood transfusion, exposure to household or office contacts with viral hepatitis and homosexuality were not important in the transmission of HBV among the HBV⁺ medical or dental personnel in our hospital. Although an increased incidence of HBV infection in the USA coincided with widespread popularity of illicit self-injection among young adults, not only in those physically or psychologically addicted, but also among those experimenting with drug abuse⁶ this has not been our experience. In fact,⁷ in a previous study from this hospital, illicit self-injection among Nigerians was very rare. It can therefore be deduced that unlike in the USA, the high prevalence of HBV in the study population is unlikely to be due to sharing of equipment for illicit self-injection. On the other hand, we have shown that the type of specialty and lack of HBV vaccination are risk factors in those who are HBV⁺.

It is not surprising that by the nature of their close contact with blood and blood products, or contaminated saliva, surgeons and dentists are more at risk of acquiring HBV. Small abrasions or cuts on their hands may allow infection. Significantly, the majority of these HCWs use universal precautions on <50% of the occasions when they carry out procedures on their patients, primarily because the hospital cannot always provide the necessary materials. This is not peculiar to our institution and may be found in similar institutions in economically restricted countries.

Recent data elsewhere⁸ has suggested that the risk of HBV infection among HCWs has decreased with the availability of HBV vaccination (and the

Table 2 Prior HBV infection and sociodemographic characteristics of doctors and dentists at the University College Hospital, Ibadan, Nigeria

Characteristic	Number HBV ⁺	Number of participants*	Prevalence (%)**	OR (95% CI)		p
				Unadjusted	Adjusted	
<i>Sex</i>						
M	22	53	41.5	1.30(0.44–5.93)	1.22(0.58–2.53)	<0.05
F	7	22	31.8	1.0	–	–
<i>Age class(years)</i>						
21–36	21	55	38.2	1.0	–	–
≥37	8	20	40.0	0.95(0.33–2.79)	0.97(0.49–1.93)	NS
<i>Years of Professional activity</i>						
≤5	6	14	47.6	1.0	–	–
6–10	14	38	36.8	0.96(0.32–4.13)	1.14(0.5–2.49)	NS
11–15	6	13	47.2	0.8(0.22–2.92)	0.85(0.38–2.19)	NS
≥16	3	10	30.0	0.87(0.42–4.51)	–	NS
<i>Type of specialty**</i>						
Physicians	8	28	28	1.0	–	–
Surgeons	11	25	44	1.53(0.46–5.15)	1.37(0.61–3.08)	<0.05
Dentists	10	22	45	1.06(0.34–3.26)	1.04(0.52–2.09)	<0.05
<i>HBV vaccination</i>						
No	27	60	43.5	2.83(0.55–19.5)	2.28(0.6–8.6)	<0.05
Yes	2	15	15.3	1.0	–	–
<i>History of transfusion</i>						
No	28	69	40.6	2.43(0.27–56.1)	2.28(0.6–8.59)	<0.05
Yes	1	6	16.7	1.0	–	–
<i>History of hepatitis</i>						
No	27	69	39.0	1.17(0.19–9.02)	1.13(0.32–3.90)	<0.05
Yes	2	6	33.3	1.0	–	–
<i>History of hepatitis in household or office contact</i>						
No	22	51	43.1	1.48(0.51–4.43)	1.33(0.64–2.80)	<0.05
Yes	7	24	29.2	1.0	–	–
<i>Exposure to patients with viral hepatitis</i>						
No	6	20	30	1.0	–	–
Yes	23	55	41.8	0.72(0.22–2.22)	0.78(0.36–1.71)	NS

HBV, hepatitis B virus; OR, odds ratio; CI, confidence interval; NS, not significant.

*Indicates the number of participants in each category on whom both results of serology and the item in question were available. **Indicates the percent of each category in whom hepatitis B surface antigen or antibody to hepatitis B core antigen was detected. Physicians are doctors from the departments of Medicine and Paediatrics. Surgeons are doctors from the departments of Surgery and Obstetrics & Gynaecology.

implementation of universal precautions). This reduced risk has not yet been fully assessed in hospital-based studies in developing countries where this policy has not been vigorously adopted. Only 20% of our participants had been immunized against HBV. This value is lower than results in several similar studies in the USA and Western Europe.^{9,10} A significant factor impeding universal implementation of HBV vaccination in HCWs is the cost of the vaccine, which is prohibitively expensive on a large scale. The group of immunized participants is more likely to be the older doctors and dentists who have

had more years of professional activity. These are more likely to have had part or whole of their undergraduate or postgraduate training in Western Europe and USA, where they would have been offered the HBV vaccination.

Data on the more recently discovered HCV infection in Africa are still incomplete and somewhat contradictory. Some seroepidemiological studies¹¹ have claimed a high prevalence of anti-HCV antibodies in healthy subjects ranging from 4% to 12.5%; others¹² have found it to be as low as that reported from Western Europe or North America, where

Table 3 Analysis of HBV non-vaccinated status of doctors and dentists in 1995 at the University College Hospital, Ibadan, Nigeria

Characteristic	Number HBV non-vaccinated	Number of participants*	Prevalence (%)**	OR (95% CI)		p
				Unadjusted	Adjusted	
<i>Sex</i>						
M	44	53	83	1.14(0.5–2.61)	1.08(0.7–1.66)	<0.05
F	16	22	72.7	1.0	–	–
<i>Age class (years)</i>						
21–36	47	55	85.5	1.0	–	–
37	13	20	65	1.31(0.55–3.16)	1.17(0.73–1.88)	<0.05
<i>Years of Professional activity</i>						
5	13	14	92.9	1.07(0.4–2.84)	1.04(0.65–1.65)	<0.05
6–10	33	38	86.8	1.13(0.4–3.23)	1.07(0.63–1.81)	<0.05
11–15	10	13	76.9	1.92(0.38–10.2)	1.52(0.59–3.94)	<0.05
16	4	10	40	1.0	–	–
<i>Type of specialty</i>						
Physicians	23	28	82.1	1.0	–	–
Surgeons	20	25	80.0	1.03(0.42–2.49)	1.01(0.65–1.58)	<0.05
Dentists	17	22	77.3	1.06(0.42–2.68)	1.03(0.65–1.65)	<0.05

HBV, hepatitis B virus; OR, odds ratio; CI, confidence interval.

* Indicates the number in each category responding to the question of HBV non-vaccination status. ** Indicates the present of each category who said they had not received vaccination to HBV.

Physicians are doctors from the departments of Medicine and Paediatrics. Surgeons are doctors from the departments of Surgery and Obstetrics & Gynaecology.

serological evidence of contact with HCV is found in <1.5% of the blood donors or general population. Many factors, including the lack of specificity and sensitivity of first-generation tests and prolonged storage of sera, have been evoked to explain some of the observed discrepancy. We used a third-generation enzyme immunoassay to make the screening more reliable. Moreover, our sera were stored for not more than 3 weeks and thawed only once at the time of testing. Therefore, we believe that our estimated prevalence of 11% of anti-HCV antibodies truly indicates a high prevalence of HCV infection in our doctors and dentists.

In conclusion, with the rationale that most carriers of HBV are either free of symptoms or have diseases that have not yet been diagnosed, we recommend strict compliance with universal precautions. Consequently, the hospital must ensure the materials for primary precautions which are appropriate to the level of the tasks, are always available to HCWs. We have also provided a scientific basis for recommending a mandatory vaccination of our doctors and dentists with HBV vaccine and the currently anticipated HCV vaccine. The vaccination should be offered free of charge to the HCWs. To compromise on this is to place lives at risk, and to lower morale among both the HCWs and the public.

References

1. Kane M. The epidemiology and control of hepatitis B as an occupational hazard in the health professions. In: Kane M, Holleran C, Andre F, eds. *Proceedings of the European Conference on Hepatitis B as an occupational hazard*. London, Gower Medical Publishing, 1991:10–15.
2. Olubuyide IO, Olawuyi F. An evaluation of self-reported incidence of accidental exposure to patients' blood and body fluids by resident doctors in Nigeria. *J Roy Soc Health* 1995; **115**:235–43.
3. Olubuyide IO. Doctors at risk of hepatitis B and HIV infections from patients in Nigeria. *J Roy Soc Health* 1996; **116**:157–60.
4. Olubuyide IO. The natural history of primary liver cell carcinoma. A study of 89 untreated adult Nigerians. *Central Afr J Med* 1992; **38**:25–30.
5. Thursz MR, Kwiatkowski D, Torok MB. Association of hepatitis B surface antigen carriage with severe malaria in Gambian children. *Nature Med* 1995; **1**:374–5. Garibaldi RA, Manson B, Gregg MB. Impact of illicit drug-associated hepatitis on viral hepatitis morbidity reports in the United States. *J Infect Dis* 1972; **126**:288–93.
6. Ohaeri JU, Odejide AC. Admissions for drug and alcohol related problems in Nigerian Psychiatric Care facilities in one year. *Drug Alcohol Dependence* 1993; **31**:101–16.
7. Thomas DL, Factor SH, Kelen GD, et al. Viral hepatitis in Health Care Personnel at the Johns Hopkins Hospital. *Arch Intern Med* 1993; **153**:1705–12.

8. Lewy R. Immunizations among hospital personnel. *J Occupat Med* 1987; **29**:433–6.
9. Astbury C, Baxter PJ. Infection risks of hospital staff from blood: hazardous injury rates and acceptance of hepatitis B immunisation. *J Soc Occupat Med* 1990; **40**:92–5.
10. Louis FJ, Mallbert B, LeHesran JY, et al. High prevalence of anti-hepatitis C virus antibodies in a Cameroon rural forest area. *Trans Roy Soc Trop Med Hyg* 1994; **88**:53–4.
11. Abdool Karis SS, Tait DR. Hepatitis C virus infection in urban and rural Natal/Kwasulu. *South Afr Med J* 1993; **83**:191–3.
12. Tibbs CJ, Palmer SJ, Coker R, et al. Prevalence of hepatitis C virus in tropical communities: the importance of confirmatory assays. *J Med Virol* 1991; **34**:143–7.