



Research Article

SEROPREVALENCE OF HEPATITIS B AND HEPATITIS C VIRUS INFECTIONS IN DENTISTS FROM BELÉM, PARÁ, BRAZIL

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Received: January 23, 2018; Revised: March 27, 2018; Accepted: March 28, 2018; Published: March 30, 2018

Abstract- A cross sectional study involving 97 dentists was conducted from January to December 2006. All professionals gave written consent for the procedure and filled out a questionnaire about some risk factors. Blood samples were analyzed to detect the serological markers: HBsAg, anti-HBs, anti-HBc and anti-HCV. A total of 59 (60.8%) dentists showed seropositivity for at least one of the viral markers to HBV. The presence of total anti-HBc was observed in 1 (1.0%) of the dentists. None of them was HBsAg, 5 (5.2%) were anti-HBc/anti-HBs positive and 53 (54.6%) dentists were anti-HBs positive. Anti-HCV seropositivity was 3.1% (3/97) and all the subjects had more than 25 years of experience in the profession. The HBV and HCV seropositivity rates among dentists of Belém, Pará was similar to that detected in Brazil and the low HBV vaccination coverage shows that there is the necessity of performing the vaccination scheme in this population.

Keywords- Hepatitis B, Hepatitis C, Serology, Dentists, Brazil.

Citation: Costa A.C.R., et al., (2018) Seroprevalence of Hepatitis B and Hepatitis C Virus Infections in Dentists from Belém, Pará, Brazil. International Journal of Microbiology Research, ISSN: 0975-5276 & E-ISSN: 0975-9174, Volume 10, Issue 3, pp.-1113-1116. DOI: <http://dx.doi.org/10.9735/0975-5276.10.3.1113-1116>

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Academic Editor / Reviewer: Sylwiochajnowska, Sandra M. cordo, Trupti B Naik

Introduction

The hepatitis caused by the Hepatitis B Virus (HBV) and by the Hepatitis C Virus (HCV) is among those infectious diseases of occupational hazard that present important index of transmission among dentist-surgeon, since the transmission may occur by parenteral way or by contaminated body fluids such as the saliva and the blood, which are more manipulated by dentist-surgeon [1-3].

Health workers are considered of risk to the acquisition of pathogens by parenteral via, including HBV, HCV and HIV [4]. The risk of occupational acquisition of these agents depends on the nature and the frequency of exposition to contaminated blood [5,6]. The transmission may occur from the patient to the health worker and vice versa and from a patient to another through contaminated instrumental [7].

In the oral cavity, the HBV is found more concentrated in the gum sulcus; the bleeding provoked by the gum inflammation makes possible the mixture of blood and saliva, making this route a possible via of transmission of this agent [8]. Besides that, there is the possibility of transmission by accidents with drill-cutting devices such as needles, saliva small particles inhalation, and also the continuous spray caused by high and low rotation pens, which provides an aerosol potentially contaminated [9].

In Brazil, there are few studies about prevalence of serologic markers of HBV and HCV infections in dentist-surgeon. The prevalence of HBsAg varies from 0.0% to 0.7% and of anti-HBc varies from 0.6% to 9.1% [10-12]. The anti-HCV prevalence varies from 0.4% to 0.9% [12-14] depending on the studied geographic region.

Some factors may contribute to the acquisition of an occupational infection by health workers like no usage or inadequate usage of personal protective equipment (PPE), the inappropriate manipulation of contaminated objects and not following biohazard procedures [9,15]. In dentists, the factors strongly related to the prevalence of occupational acquisition of HBV and HCV infection are the lack of vaccination for HBV and continuous exposure to blood and other fluids potentially contaminated with these agents [16].

The goal of the present paper was to determine the seroprevalence of markers of HBV and HCV infection in dentists in the city of Belém, Pará and to establish the possible factors associated to the infection with these viruses.

Materials and Methods

Studied population and ethical aspects

A descriptive cross-sectional study was conducted between January and December 2006 and among dentist-surgeons who work in the city of Belém, Pará, North Region of Brazil. In this period 150 dentists were visited but only 97 accepted to participate in this study. The volunteers, in the interview, were informed about the project's objectives and, after the proper explanation, a term of free and informed consent was signed.

The epidemiological data were collected by means of a semi-structured questionnaire, self applicable, with the dentists, which dealt with aspects related to the risks of HBV and HCV transmission, as well as the history of previous blood transfusion, sexual preferences, illicit drugs usage and previous history of viral hepatitis. Besides that, some aspects related to the risk of occupational acquisition were related, as the usage of personal protection equipment (PPE) and the vaccination for HBV.

The proposal for this study was submitted and approved to the Research Ethics Commission of Health Science Center of the Federal University of Para under number 008/06. Procedures followed the guidelines and regulatory standards for research involving human subjects of the Brazilian National Health Council.

Sample collection

A blood sample (5,0mL) was collected from the dentist-surgeons that consented in participating in their professional place of work. A vacuum system tube with EDTA as anticoagulant was used; the samples were transported to and processed in the Virology Laboratory in Biological Science Institute of the Federal University of

Pará. After blood centrifugation for 5 min at 3.000 rpm, plasma samples were isolated and so was the blood portion and, both were stored at -20°C until the proper time to perform the serological tests.

Serology

The plasma samples were tested for the presence of antibodies anti-HBV, using an immunenzymatic assay that included the combined usage of recombinant antigens from viral envelope and capsid. The serological markers used were HBsAg, antibodies anti-HBs and anti-total-HBc (Diasorin S.p.A, Saluggia, Itália). The investigation for antibodies anti-HCV (Ortho Clinical Diagnostics Inc, New Jersey, EUA) was performed by immuneadsorbed assay linked to enzymes that use microcavities coated with recombinant antigens of HCV as a solid phase. All the serological assays were done in the Virology Laboratory of Biological Science Institute of the Federal University of Pará and performed in agreement with the manufacturers' specifications.

Results

The studied population was composed by 40.2% (39/97) male dentist-surgeons and 59.8% (58/97) by female professionals. The mean age was of 39.1 years old (range from 24 to 63 years) and the majority was 24 to 35 years old (42.3%). Distribution of demographic characteristics, type of dental activity, vaccination details, risk factors and using protective measures are shown in [Table-1].

Table-1 Distribution of demographic characteristics, type of dental activity, vaccination details, risk factors and using protective measures in dentists from Belém, Pará, 2006.

	N	%
Age		
24-35	41	42.3
36-47	32	32.9
48-59	21	21.7
> 60	3	3.1
Years of profession		
< 6	20	20.6
7-12	22	22.7
13-18	21	21.6
19-24	12	12.4
25-30	13	13.4
> 30	9	9.3
Specialty		
Endodontic	39	40.2
Periodontics	28	28.8
Orthodontic	20	20.7
Pediatric dentistry	10	10.3
Use of PPE*		
Masks	94	96.9
Gloves	94	96.9
Protective hair	78	80.4
Protective clothing	94	96.9
Protective eyewear	68	70.1
Protective foot	18	18.6
History of hepatitis		
Hepatitis A	16	16.4
Hepatitis B	1	1.1
Unknown	3	3.1
Never	77	79.4
Hepatitis B vaccine		
Complete protocol	76	78.3
Incomplete protocol	12	12.4
Vaccination no	2	2.1
Vaccination Unknown	7	7.2

* Personal protective equipment

The mean time of profession was 18.5 years, ranging from less than six (20.6%) to more than 30 years (9.3%). Related to the expertise, 12.4% declared that they do not have any specialization title, 72.1% declared to have only one specialization and 15.5% related to have more than one specialization. Among the specialties, the most mentioned was endodontic (40.2%), followed by periodontics, orthodontics and pediatric dentistry. Gloves and masks were the most PPE used

(96.9% for both). Protective eyewear and protective foot were the less adopted PPE (70.1% and 18.6% respectively).

The majority of participants declared no history of hepatitis (79.4%) and 16.4% reported having hepatitis A. About vaccination for HBV, 78.3% were submitted to the whole vaccination protocol, 12.4% said that have received the vaccines, but incompletely, 7.2% couldn't recall being vaccinated and 2.1% were not vaccinated.

The serological analysis showed in relation to HBV, 60.8% (59/97) of the studied samples were positive for at least one of the viral markers used, including anti-HBs isolated. From these, 61.8% (60/97) were female and 38.2% (37/97) were male. The majority of the samples (54.6%; 53/97) were reactive only for the viral marker anti-HBs and 1.0% (1/97) for the antibody anti-HBc only. In 5.2% (5/97) of the samples the simultaneous presence of antibodies anti-HBs and anti-total-HBc was observed. In the samples positive for total anti-HBc, there was no seropositivity for the IgM anti-HBc antibody. The description of the serological profile of the dentist is presented on [Table-2].

Table-2 Seroprevalence of HBV and HCV markers in dentists from Belém, Pará, 2006.

Serological markers	Pos	%	Neg	%
HBsAg	0	0.0	97	100.0
Total Anti-HBc/Anti-HBs	5	5.2	92	94.8
Total anti-HBc	1	1.0	96	99.0
Anti-HBs alone	53	54.6	44	45.4
Anti-HCV	3	3.1	94	96.9

The search for antibodies anti-HCV showed the presence of seropositivity in 3,1% (3/97) of the analyzed samples. All the subjects were male, two with age ranging from 48 to 59 years old and one with more than 60 years. All the subjects seropositive to the HCV had more than 25 years of experience in the profession and two were endodontic, while one was periodontics.

Considering sexual behavior of the seropositive to the HCV, two individuals related that had sex relation with sexual workers and have never used condoms. In respect to the history of sexual transmitted infection, syphilis was reported for one of the subjects. One of these dentists declared that had already had hepatitis, but did not know which type.

Regarding to the correlation between profession experience and previous exposition to one of the infectious agents, it was verified that half of the dentist that showed sera reagent to the markers of HBV and HCV had more than 30 years of experience, but no significance statistical was observed. The prevalence of serologic markers for HBV and HCV according to age, years of professional practice and specialty are shown in [Table-3].

Discussion

Several studies have shown a higher prevalence of HBV markers in health workers than in the general population [17-19]. The frequency and the duration of the contact with blood from patients harboring HBV and HCV are determinant of infection [20]. This present paper is the first HBV and HCV seroprevalence description in dentists from Belém, Pará, Northern Brazil. The prevalence of HBV or HCV infection detected in the present study was similar to that detected by other investigators among dentists in Brazil. There was no positivity to the HBsAg marker in the analyzed samples. The low prevalence of this serological marker was similar to the one found in dentists from other cities in the Brazil, such as Goiânia (0.0%) [10], Campo Grande (0.6%) [11] and São Paulo (0.7%) [12]. The seroprevalence of anti-HBc/anti-HBs markers in the examined population was 5.2%, which points out to a previous contact with the HBV. This prevalence was similar to found in dentists of Goiânia (5.9%) [10] but it was smaller than observed in dentists of Campo Grande (9.1%) [11] and of São Paulo (8.1%) [12] and this difference can be due to the small sample size in the present study. In the population examined in this study, the seroprevalence of anti-HCV were 3.1%, higher than the one found in the general population that ranges from 1-2% [21-23]. When compared to other risk groups, the HCV prevalence found was higher than in Uberaba [24], Pará [25], Belo Horizonte [26] but similar to observed among prisoners in Central Brazil [27] and healthcare waste workers [28],

suggesting that this profession exposes the worker to the blood and other organic fluids and raises the risk of acquiring infections transmitted by parenteral pathways.

Table-3 Prevalence of serologic markers for HBV and HCV according to age, years of professional practice and specialty among the 97 dentists in the Belém, Pará, Brazil, 2006.

Variable	N	Proportion (%) of participants			
		Positive for Anti-HBc/total	Positive for Anti-HBc+Anti-HBs/total	Positive for Anti-HBs/total	Positive for Anti-HCV/total
Age					
24-35	41	0	0	29/41 (70.7)	0
36-47	32	1/32 (3.1)	1/32 (3.1)	14/32 (43.7)	0
48-59	21	0	3/21 (14.3)	10/21 (47.6)	2/21 (9.5)
> 60	3	0	1/3 (33.3)	0	1/3 (33.3)
Years of profession					
< 6	20	0	0	14/20 (70.0)	0
7-12	22	0	0	16/22 (72.7)	0
13-18	21	1/21 (4.7)	1/21 (4.7)	13/21 (61.9)	0
19-24	12	0	1/12 (8.3)	5/12 (41.7)	0
25-30	13	0	1/13 (7.7)	5/13 (38.4)	0
> 30	9	0	2/9 (22.2)	0	3/9 (33.3)
Specialty					
Endodontic	39	1/39 (2.6)	3/39 (7.7)	20/29 (68.9)	2/39 (5.2)
Periodontic	28	0	1/28 (3.6)	18/28 (64.3)	1/28 (3.6)
Orthodontic	20	0	1/20 (5.0)	10/20 (50.0)	0

The risk of HBV acquisition by dentist was already associated to the lack of vaccination [29]. In Brazil, the prevalence and the risk of acquiring HBV and HCV was associated to the type of specialization, years of work and lack of vaccination against B hepatitis [10,11,30].

In respect to the vaccination for HBV, it may be observed that the percentage of declared vaccinated professionals (90.7%) was similar to the one mentioned in various cities of Brazil [10-12]. Among the reasonable explanations for the absence of vaccination, we may convene negligence, the disregard and the lack of information about the infection [31].

The evaluation of the vaccine coverage in the dentist from Belém showed that 57.7% were immunized by the complete or incomplete vaccine scheme, 22.2% after receiving or not the vaccine and 36.4% of the ones that mentioned taking the vaccine were not immunized. These results were similar to the one found in Acre [32], in which the percentage of non vaccinated of the general population was 39.0%, possibly indicating that there is some adherence to the vaccination scheme, although it is being performed incorrectly so as to favor the immunization. The presence of serological markers that indicates the previous contact with HBV or HCV presented a significant growing tendency in respect to the time of profession pursuing. These results were similar to observed in Goiânia [10], indicating that the proportion of subjects that already had a contact with this virus is correlated with the years of experience emphasizing the necessity of knowing the prevention measures in dentist clinical practice. On the other hand, it was not possible to establish dependency between the area of work and the positive serology for one the markers of HBV and/or HCV, due to the limited number of samples.

Conclusion

In conclusion, the present study indicated that in Belém the prevalence of HBV or HCV infection in dentist is not different when compared to others cities of Brazil. Although the study was performed with samples collected in 2006, this is the first approach to study HBV and HCV markers among dentists in the state of Para and it will certainly serve as a basis for future studies. Our data shows that there is the necessity of performing the vaccination scheme and the serological control as one of the main prevention measures and help in the determination of the prophylaxis after exposition, since when seroconversion does not happen it is recommended the revaccination fulfilling the scheme of three doses.

Application of research: In Descriptive Epidemiology and Viral Serological Markers

Research Category: Epidemiology and Virology

Conflict of Interest: None declared.

Acknowledgment / Funding resource: We acknowledge all subjects enrolled in the present study and PROPESP/UFPA.

*** Principle Investigator:** Dr Luiz Fernando Almeida Machado

University: Federal University of Pará

Research project name or number: MSc Thesis in Biology of Infectious and Parasitic Agents Graduate Program at the Federal University of Pará

Author Contributions: All the authors equally contributed in this article.

Abbreviations: HBV: Hepatitis B Virus, HCV: Hepatitis C Virus, PPE: Personal protective equipment, HIV: Human immunodeficiency virus.

Ethical approval: This study was approved by Research Ethics Commission of Health Science Center of the Federal University of Para under number 008/06. Written informed consent was obtained from all participants prior to enrollment.

References

- [1] Ahmad M.S., Razak I.A. and Borromeo G.L. (2015) *European Journal of Dental Education*, 19(1), 44-52.
- [2] Mahboobi N., Oliaei P. and Alavian S.M. (2014) *Iranian Endodontic Journal*, 9(3), 169-173.
- [3] Garbin C.A., de Souza N.P., de Vasconcelos R.R., Garbin A.J. and Villar L.M. (2014) *Oral Health & Preventive Dentistry*, 12(4), 313-321.
- [4] Coppola N., De Pascalis S., Onorato L., Calò F., Sagnelli C. and Sagnelli E. (2016) *World Journal of Hepatology*, 8(5), 273-281.
- [5] Mahboobi N., Agha-Hosseini F., Safari S., Lavanchy D. and Alavian S.M. (2010) *Journal of Viral Hepatitis*, 17(5), 307-316.
- [6] Dahiya P., Kamal R., Sharma V. and Kaur S. (2015) *Journal of Education and Health Promotion*, 4, 33.
- [7] Marković-Denić L., Branković M., Maksimović N., Jovanović B., Petrović I., Simić M. and Lesić A. (2013) *Srpski Arhiv Za Celokupno Lekarstvo*, 141(11-12), 789-793.
- [8] Mahboobi N., Porter S.R., Karayiannis P. and Alavian S.M.J. (2013) *Journal of Gastrointestinal and Liver Diseases*, 22(1), 79-86.
- [9] Alvarado-Ramy F. and Beltrami E.M. (2003) *Cleveland Clinic Journal of Medicine*, 70(5), 457-465.
- [10] de Paiva E.M., Tiplle A.F., de Paiva Silva E. and de Paula Cardoso D. (2008) *Brazilian Journal of Microbiology*, 39(2), 251-256.
- [11] Batista S.M., Andreasi M.S., Borges A.M., Lindenberg A.S., Silva A.L.,

- Fernandes T.D., Pereira E.F., Basmage E.A. and Cardoso D.D. (2006) *Memórias do Instituto Oswaldo Cruz*, 101(3), 263-267.
- [12] Bellissimo-Rodrigues W.T., Machado A.A., Bellissimo-Rodrigues F., Nascimento M.P. and Figueiredo J.F. (2006) *Infection Control & Hospital Epidemiology*, 27(8), 887-888.
- [13] Takahama A.J., Tatsch F., Tannus G. and Lopes M.A. (2005) *Community Dental Health Journal*, 22(3), 184-187.
- [14] Resende V.L., Abreu M.H., Paiva S.M., Teixeira R. and Pordeus I.A. (2009) *Virology Journal*, 6, 228.
- [15] Khandelwal P. and Hajira N. (2015) *International Journal of Applied Dental Sciences*, 1(4), 163-165.
- [16] Ayatollahi J., Ayatollahi F., Ardekani A.M., Bahrololoomi R., Ayatollahi A. and Owlia M.B. (2012) *Dental Research Journal*, 9(1), 2-7.
- [17] Alese O.O., Alese M.O., Ohunakin A. and Oluyide P.O. (2016) *Journal of Clinical and Diagnostic Research*, 10(2), LC16-8.
- [18] Shoaie P., Najafi S., Lotfi N., Vakili B., Ataei B., Yaran M. and Shafiei R. (2015) *Asian Journal of Transfusion Science*, 9(2), 138-140.
- [19] Mohammad Nejad E., Jafari S., Mahmoodi M., Begjani J., Roghayeh Ehsani S. and Rabirad N. (2011) *Hepatitis Monthly*, 11(8), 662-663.
- [20] Khalil Sa.S., Khalil O.A., Lopes-Júnior L.C., Cabral D.B., Bomfim E.O., Landucci L.F. and Santos M.L. (2015) *American Journal of Infection Control*, 43(8), e39-41.
- [21] Kershenobich D., Razavi H.A., Sánchez-Avila J.F., Bessone F., Coelho H.S., Dagher L., Gonçalves F.L., Quiroz J.F., Rodriguez-Perez F., Rosado B., Wallace C., Negro F. and Silva M. (2011) *Liver International*, 31 Suppl 2, 18-29.
- [22] Zarife M.A., Silva L.K., Silva M.B., Lopes G.B., Barreto M.L., Teixeira M.G., Dourado I. and Reis M.G. (2006) *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 100(7), 663-668.
- [23] da Fonseca J.C. and Brasil L.M. (2004) *Revista da Sociedade Brasileira de Medicina Tropical*, 37, Suppl 2, 1-8.
- [24] Garcia F.B., Pereira Ge.A., Martins P.R. and Moraes-Souza H. (2009) *Revista da Sociedade Brasileira de Medicina Tropical*, 42(1), 1-4.
- [25] Oliveira-Filho A.B., Pimenta Ao.S., Rojas Me.F., Chagas M.C., Crespo D.M., Crescente J.A. and Lemos J.A.R. (2010) *Cadernos de Saúde Pública*, 26(4), 837-844.
- [26] Mendes-Oliveira F., Bolina-Santos E., Salomon T., Miranda C., Cioffi J., Sabino E., Barbosa-Stancioli E., Moreno E. and Carneiro-Proietti A.B. (2015) *Transfusion and Apheresis Science*, 53(2), 238-241.
- [27] Puga M.A., Bandeira L.M., Pompilio M.A., Croda J., Rezende G.R., Dorisbor L.F., Tanaka T.S., Cesar G.A., Teles S.A., Simionatto S., Novais A.R., Nepomuceno B., Castro L.S., Lago B.V. and Motta-Castro A.R. (2017) *PLoS One*, 12(1), e0169195.
- [28] Mol M.P., Gonçalves J.P., Silva E.A., Scarponi C.F., Greco D.B., Cairncross S. and Heller L. (2016) *Waste Management & Research*, 34(9), 875-883.
- [29] Azodo C., Ehizele A. Uche I. and Erhabor P. (2012) *Annals of Medical and Health Sciences Research*, 2(1), 24-8.
- [30] Sacchetto M.S., Barros S.S., Araripe Te.A., Silva A.M., Faustino S.K. and da Silva J.M. (2013) *Hepatitis Monthly*, 13(10), e13670.
- [31] Ferreira R.C., Guimarães A.L., Pereira R.D., Andrade R.M., Xavier R.P. and Martins A.M. (2012) *Revista Brasileira de Epidemiologia*, 15(2), 315-323.
- [32] Tavares-Neto J., Almeida D., Soares M.C., Uchoa R., Viana S., Darub R., Farias E., Rocha G., Vitvitski L. and Paraná R. (2004) *The Brazilian Journal of Infectious Diseases*, 8(2), 133-9.