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Seroepidemiology of Viral Hepatitis and HIV Infection among the Professional Dental Clinic Staff in Tehran

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Abstract: This seroepidemiologic cross-sectional study was carried out to determining the prevalence of serologic markers of HBV, HCV and HIV among the professional dental clinic personnel and assessing variations across some related factors in Tehran, I.R. of Iran. Spearman correlation coefficient was used to evaluate relationships between HBS Ab with age, doses of vaccination and duration after vaccination. Logistic regression models were used to calculate odds ratios (Ors) and 95% confidence intervals (CIs) for all independent variables. All analyses were carried out using SPSS version 15.0 software. Of total participants, seroprevalence was estimated for protective HBS Ab (90.5%), HBC Ab (2.8%), HBS Ag (0.6%), HCV Ab (0.0%) and for HIV Ab1/2 (0.0%) respectively. Spearman's rank coefficient showed duration after vaccination (r= -0.11) were noted to be correlated with HBS Ab (P<0.014) and not correlated with age(r= -0.06) and doses of vaccination (r=0.19). Logistic regression showed demographic characteristics of participants to be independentlyassociated with odds of having protective HBS Ab. Integration of HCV and HBV counseling into HIV existing prevention services might represent a valuable approach to reach high-risk individuals.

Key words: Seroepidemiology · Viral hepatitis · HIV infection · Dentistry

INTRODUCTION

Viral hepatitis and HIV infections are key public health threats that pose an enormous risk for disease transmission in the general population. Chronic infections with hepatitis B virus (HBV) and hepatitis C virus (HCV) are leading causes of hepatocellular carcinoma, conditions which incidence rate remain high in the developing world and are rising across most developed countries [1]. Approximately 30% of the world's population, i.e. about 2 billion people, has serological evidence of current or past infection with hepatitis B virus [2]. Nearly 45% of the world's population lives in regions where chronic HBV infection is endemic, including most of Asia and the Pacific Islands, Africa and the Middle East [3]. Hepatitis B virus accounts for an estimated 370 million chronic infection worldwide.

There were an estimated 33 million [30 million-36 million] people living with HIV infection [4], 2.1 million died of AIDS and 2-4 million HIV infected persons having chronic co infection [5]. In 2007, the Centers for Disease Control and Prevention estimated that 85,000 new acute viral hepatitis cases and nearly 19 million new sexually transmitted infections (STIs) occurred in the United States (US) [6,7]. In addition to the physical and psychological consequences of these diseases, the economic impact of STIs and of the viral hepatitis in the US are conservatively estimated at $15.3 billion annually, based on 2007 dollars and $1.8 billion, based on 1999 dollars, respectively [8,9]. In the Middle East, Bahrain, Iran, Kuwait are areas of low endemic for hepatitis B [10]. A safe and effective vaccine against hepatitis B has been available since 1982. WHO recommends that hepatitis B vaccine be included in routine immunization schedules for all children in all

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countries [11]. The prevalence of hepatitis C virus (HCV) in developed countries amounts to 0.2%-2.2%, while in developing countries it reaches 7%. In some regions or risk group the rate of occurrence may be as high as 30%-90%. In Iran, according to the latest data, it is estimated that between 0.12-0.89 percent of the general population present anti-hepatitis C virus antibodies, which corresponds to as many as 0.5 million chronic carriers [12,13]. Dental patients and dental health care personnel are at risk for infection with microorganisms that either colonize or infect the oral cavity and the respiratory tract or may be present in the oral tissues from the circulating blood [14].

Epidemiologic data regarding the burden of viral hepatitis and information on the burden of HIV and related complications in the professional dental clinic staff are limited in scope and comprehensiveness, limiting the planning of prevention interventions and monitoring their effectiveness to control these infections. We determined prevalence estimates of serologic markers of HBV, HCV and HIV and assessed variations across sociodemographic characteristics in the professional dental clinic in Tehran, I.R. of Iran.

MATERIALS AND METHODS

A seroepidemiologic cross-sectional study was conducted to determining the association between age groups, type of jobs, educational levels, doses of vaccination and time interval after vaccination with Prevalence of viral hepatitis and HIV infection in professional dental clinic staff in Tehran, I.R. of Iran. The study population was including dentists, dental assistants and other co workers in this center. The sample in which a simple random sampling design was used consisted of 179 person aged between 20 and 53 years in 2009.

Participants completed a face-to-face interview and then were asked to complete a self-administered questionnaire. Trained interviewer conducted the personal interview and was available to answer questions during the self-administered questionnaire. After interviewing, a certified phlebotomist collected blood specimens of 7-10ml for HBV, HCV and HIV testing. Participants, whose protective test results were negative, received post-counseling and referrals for follow-up medical evaluation. Field work was conducted between January 2009 and June 2009.

According to time interval from last dose of vaccine injection, as (a) end of the two year, (b) 3 - 5 years and (c) = 6 years, the subjects were divided into three separate groups.

Regarding to HBsAb(IU/L) level, three classes were defined: (1) nonresponders: anti-HBs level < 10 IU/L; (2) poor responders anti-HBs level of 10 - 100 IU/L and (3) good immune responders: anti-HBs level of > 100 IU/L. A separate model with time interval (years) and HBsAb (IU/L) as continuous variables were also considered.

Laboratory Analyses: Testing for HBsAb, HBsAg and HBcAb were performed with a chemiluminiscent immunoassay. Testing for antibody to HCV and HIV Ab1/2 was determined by enzyme-linked immunosorbent assay (ELISA) method using the Organon kits (Germany).

Statistical Analyses: Prevalence of viral hepatitis (HBV, HCV) and HIV infection were estimated using traditional formula. Continuous variables are presented as mean and standard deviation. Categorical variables are presented as absolute and relative frequencies. Spearman rank correlation coefficient was used to evaluate linear relationships between HBS Ab with age groups, educational levels, doses of vaccination. Bivariate logistic regression models were used to calculate ORs and 95% CIs for all independent variables [15]. All reported P-values are based on two-sided hypotheses. All analyses were carried out using Statistical Package for the Social Sciences (SPSS) version 15.0 software.

RESULTS

A total of 179 adults participated in the study. Mean age of participants was 33.7 years (STD = 7.1). Of the total participants, 47.5% were male, 58.7% had academic education, 75.9% had high risk job and 87.1% got 3 doses of vaccination. Only 5.7% of subjects had not completed vaccination. Utilizing sera collected from subjects found overall prevalence of hepatitis B surface antigen-positive (HBsAg +) persons to be 0.6%, hepatitis B core antibody-positive (HBcAb +) to be (2.8%), hepatitis C antibody-positive (HCVAb +) to be (0.0%) and for HIV-1/2 antibody-positive to be (0.0%) respectively Table (1). Seroprevalence of viral hepatitis and HIV infection related to some factors are shown in Table 2. Regarding the years following last inoculation, 3.7% belongs to end of the two years, 50.7% to 3 - 5 years and 45.6% to = 6 years respectively. Of the total participants, 90.5% have had protective antibody against HBV (anti-HBs level = 10 IU/L). According to HBsAb (IU/L) level, 9.5% were no immune responders, 14.0% poor and 76.5% were good immune responders respectively. Of Participants who have received two, three, four and more doses of vaccine, in sequences 30.0%, 7.7% and 14.3% were no immune respondents. Spearman's rank coefficient showed time

Table 1: Characteristics of participants in the study of seroepidemiology of viral hepatitis and HIV infection among the professional dental clinic staff in Tehran, I.R. of Iran

Related factors	Number	Percent
Age groups (year)		
≤25	16	8.9
26-30	56	31.3
31-35	48	26.8
36-40	24	13.4
41-45	22	12.3
≥ 46	13	7.3
Total	179	100.0
Sex		
Male	85	47.5
Female	94	52.5
Total	179	100.0
Level of schooling		
Primary and Diploma	74	41.3
Technical and higher education	105	58.7
Total	179	100.0
High risk jobs		
Yes	135	75.4
No	44	24.6
Total	179	100.0
Doses of vaccination		
2	10	5.6
3	155	87.6
> 3	14	7.8
Total	179	100.0

Table 2: Seroprevalence of viral hepatitis and HIV infection among the professional dental clinic staff in Tehran, I.R. of Iran

Related factors	HbsAb+	HbsAg+	HbcAb+	HCVAb+	HIV Ab1/2 +
Age groups (year)					
≤25	100.0	0.0	0.0	0.0	0.0
26-30	100.0	100.0	40.0	0.0	0.0
31-35	100.0	0.0	20.0	0.0	0.0
36-40	100.0	0.0	20.0	0.0	0.0
41-45	100.0	0.0	0.0	0.0	0.0
≥ 46	100.0	0.0	20.0	0.0	0.0
Total	100.0	0.6	2.8	0.0	0.0
Sex					
Male	100.0	100.0	80.0	0.0	0.0
Female	100.0	0.0	20.0	0.0	0.0
Total	100.0	0.6	2.8	0.0	0.0
Level of schooling					
Primary and Diploma	100.0	0.0	40.0	0.0	0.0
Technical and higher education	100.0	100.0	60.0	0.0	0.0
Total	100.0	0.6	2.8	0.0	0.0
High risk jobs					
Yes	100.0	100.0	80.0	0.0	0.0
No	100.0	0.0	20.0	0.0	0.0
Total	100.0	0.6	2.8	0.0	0.0
Doses of vaccination					
2	100.0	0.0	0.0	0.0	0.0
3	100.0	100.0	100.0	0.0	0.0
> 3	100.0	0.0	0.0	0.0	0.0
Total	100.0	0.6	2.8	0.0	0.0

Table 3: Prevalence Odds Ratio (OR) of protective HBsAb in the study of seroepidemiology of viral hepatitis and HIV infection among the professional dental clinic staff in Tehran, I.R. of Iran

Related factors	OR	(95% CI)
Age groups (year)		
≤25	Baseline	-
26-30	1.27	0.15- 10.53
31-35	2.36	0.38- 14.56
36-40	1.27	0.23- 07.20
41-45	2.00	0.25- 16.16
≥ 46	3.82	0.31- 46.93
Sex		
Male	Baseline	-
Female	1.87	0.62- 5.62
Level of schooling		
Primary and Diploma	Baseline	-
Technical and higher education	0.34	0.11- 1.11
High risk jobs		
No	Baseline	-
Yes	1.44	0.44- 4.71
Doses of vaccination		
2	Baseline	-
3	0.36	0.05- 2.92
> 3	1.99	0.04- 9.92

interval after vaccination (r=-0.11) were noted to be correlated with HBS Ab (P< 0.014) and not correlated with age (r=-0.06) and doses of vaccination (r=0.19) respectively (P>0.05). Prevalence OR (95% CI) of protective HBsAb in age group =46 years vs =25 years, female vs male sex, academic education vs primary and diploma, high risky jobs vs others and above three doses vaccine injection vs lower doses vaccine injection in sequence were 3.82 (0.31- 46.93), 1.87 (0.62- 5.62), 0.34 (0.11- 1.11), 1.44 (0.44- 4.71) and 1.99 (0.04- 9.92) respectively. Logistic regression showed demographic haracteristics of participants to be independently associated with odds of having protective antibody against HBV (P> 0.05) Table 3.

DISCUSSION

Viral hepatitis and STIs share similar at-risk populations and risk factors. For example, those who are infected with certain STIs have a three to five-fold increased risk for HIV infection, 33% of all HIV-infected persons are HCV infected and 5-15% of HIV-infected persons are co-infected with HBV [8,9]. Health-care workers, especially physicians and dentists, can transmit serious viral infections to patients during invasive procedures. The risk of getting infected with various infectious agents is higher than in the general population and they may play a role in transmitting infectious agents to others. Although the serological, epidemiological and possible risk factors of viral hepatitis and HIV infection here obtained were related to a small group, this study was justified by the limitation of information about these infections in professional dental clinic staff as high risk group in the world. Among the viral hepatitis, the immunopathogenesis of HBV and HCV have been studies most extensively [16].

In present study all of participants defined as having received vaccine against HBV. Hence, they have serologic evidence of hepatitis B vaccination. In other words, 97.2% of subjects have serologic marker of anti-HBV. These findings parallel results from other studies that consistently that a large percentage of person who had history of vaccine injection having serologic evidence of HBV antibody [17,18]. Alavian [19] in a study of coverage of HBV vaccination of 334 dentists in 2004 concluded the history of HBV vaccination in 94.9% of dentists, but complete vaccination was administered in 74.8% of dentists. These results are roughly in agreement with estimate obtained in the present study. According to HBsAb (IU/L) level, 9.5% were no immune responders, while it's lower than the result obtained by Mikaeli and *et al* [20]. Logistic regression showed demographic characteristics of participants to be independently associated with odds of having protective antibody against HBV (P> 0.05). According to the findings of Mikaeli *et al* (2004), assessment of immunization rate of hepatitis B vaccination among health care personnel in Tehran, there were no significant relationship between gender and age. In a study carried out by Resuli *et al* [21], epidemiology of HBV in Albania, there were no significant differences between male and female.

Utilizing sera collected from subjects found overall prevalence of hepatitis B surface antigen to be 0.6%. Total hepatitis B prevalence for our study is substantially lower within the past 15 years than for similar culturally targeted HBV screening programs in other national studies [22,23]. Positivity to anti-HBc (2.8%) testing were not significantly ($p > 0.05$) associated to protective HBs antibody against HBV. It may be due to history of past infection with HBV.When age groups, gender, level of schooling, jobs and doses of vaccine injection were examined; anti-HBc prevalence was not statistically significant ($p > 0.05$). It may be due to a low percent (2.8%) of Positive anti-HBc. These findings disagreement with results obtained by Russmann *et al* in the study of prevalence and associated factors of viral hepatitis and transferrin elevations in 5036 patients admitted to the emergency room of a Swiss university hospital [24].

Chronic HCV infection represents one of the major public health problems in Iran and according to the annual IBTO internal reports; it is estimated to be less than 0.1% [13]. In the present study, overall prevalence of HCV Ab and HIV-Ab1/2 were (0.0%) respectively. These results are lower and disagreement with estimate obtained in other national studies [25-28]. As expected, anti-HBs decreased markedly with time interval after vaccination, but 96.4% of person had protective level of Ab in their sera even for more than 6 years. The results obtained in this study are agreement with the results of other national studies [17,18,29,30] and also in other countries [31-33]. Increasing anti-HBs with age and doses of vaccine injection are not statistically significant ($P>0.05$). Potential explanations for the later result include small sample size and individual characteristics.

CONCLUSION

This study sheds light on the epidemiology of viral hepatitis and HIV infection and underscores their disproportionate impact among specific population. The majority of personnel have protective Ab against HBV, the minority has positive HBS Ag and none of them have positive HIV-Ab1/2. These results are good situation for dental clinic because not only the majority of high risk personnel will not get hepatitis B, but also transmit to patients. While, 10 high risk personnel (7.4%) has not protective Ab against HBV; hence, they maybe get the infection and then transmit to others. Integration of HCV and HBV counseling into HIV existing prevention services might represent a valuable approach to reach high-risk individuals.

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REFERENCES

1. Shariff, M.I., IJ. Cox, A.I. Gomaa, S.A. Khan, W. Gedroyc, S.D. Taylor-Robinson, 2009. Hepatocellular carcinoma: current trends in worldwide epidemiology, risk factors, diagnosis and therapeutics. Expert Review of Gastroenterology and Hepatol., 3: 353-367.
2. World Health Organization: http://www. who. int/mediacentre/factsheets/fs204/en/
3. Custer, B., S.D. Sullivan, T.K. Hazlet, U. Iloeje, D.L. Veenstra and K.V. Kowdley, 2004.. Global epidemiology of hepatitis B virus. J. Clinical Gastroenterol., 38(10 Suppl): S158--68.
4. World Health Organization,2008/. http://www. unaids.org/en/KnowledgeCentre/HIVData/ GlobalReport/2008/2008_Global_report.asp.
5. Zuure, F., S. Hahne, T. Laar, M. van de, Prins and J. Steenbergen, 2010/. Blood borme and sexual transmission: B. hepatitis and C. in, A. Kramer, M. Kretzschmar, K. Krickeberg, Modern Infectious Diseases Epidemiology, Springer, USA., pp: 333-356
6. Centers for Disease Control and Prevention. 2009. Surveillance for acute viral hepatitis - United States, 2007. MMWR Surveillance Summary, 58: 1-27.
7. Centers for Disease Control and Prevention,2008.: Sexually Transmitted Disease Surveillance, 2007. Atlanta, Georgia: U.S. Department of Health and Human Services.
8. Chesson, H.W. D. Collins and K. Koski, 2008. K: Formulas for estimating the costs averted by sexually transmitted infection (STI) prevention programs in the United States. Cost Effectiveness and Resource Allocation, pp: 6-10

9. Centers for Disease Control and Prevention,2009.: *Addressing social determinants of health: Accelerating the prevention and control of HIV/AIDS, viral hepatitis, STD and TB. External Consultation Meeting Report.* Atlanta, Georgia: Centers for Disease Control and Prevention,
10. Andre, F., 2000. Hepatitis B epidemiology in Asia, the Middle East and Africa. Vaccine, 18: S20-2.
11. WHO, 2004. WHO position paper: Hepatitis V vaccines. Geneva: WHO. http://www. who. int/immunization/topics/hepatitis_b/en/index.html.
12. Ghavanini, A.A. and M.R. Sabri, 2000. Hepatitis B surface antigen and anti-hepatitis C antibodies among blood donors in the Islamic Republic of Iran. Eastern Mediterranean Health J., 6: 1114-1116.
13. Alavian, S.M., B. Gholami and S. Masarrat, 2002. Hepatitis C risk factors in Iranian volunteer blood donors: a case-control study. J. Gastroenterology and Hepatol., 17: 1092-1097.
14. Younai, F.S., 2010. Health care-associated transmission of hepatitis B and C viruses in dental care (dentistry). Clinical Liver Dis., 14(1): 93-104.
15. Woodward, M., 2005. Text in Statistical Science, Epidemiology, Study design and data analysis. 2nd Edition, Chpman and Hall/CRC, USA.,
16. Dienstag, J.L., 2008. Acute viral hepatitis in: A.S. Fauci, E. Brouwald, D.L. Kasper, S.L. Hauser, D.L. Longo and J.L. Jameson, Harrison's principle of internal medicine.17th Ed. New York: Mc Graw-Hill., pp: 1932-1941.
17. Amini S, S.Andalibi and S.M. Mahmoodi,2002. Anti-HBs response and its protective effect in children and adults receiving hepatitis B recombinant vaccine in Tehran. Iranian J. Medical. Sci., 27: 101-5.
18. Moghaddam, S.D., M.J. Zahedi and R. Rostam Yazdani, 2004. Persistence of immune response after hepatitis B vaccination in medical students and residents. Arch Iranian Med., 7(1): 37-40.
19. Alavian, S.M., H. Akbari, M. Ahmadzad-Asl, M. Kazem, A. Davoudi and H. Tavangar, 2005. Concerns regarding dentists' compliance in hepatitis B vaccination and infection control. American J.Infec Control., 33: 428-9.
20. Mikaeli, J., M.R. Sohrabi, B.Z. Alizadeh and F. Farrokhi, 2004. Assessment of Immunization Rate of Hepatitis B Vaccination among Health Care Personnel in Tehran. Govaresh, 4: 266-271.
21. Resuli, B., S. Prifti, B. Kraja, T. Nurka, M. Basho and E. Sadiku, 2009. Epidemiology of hepatitis B virus infection in Albania. World J. Gastroenterol., 15(7): 849-852.
22. Alavian, S.M., F. Fallahian and K.B. Lankarani, 2010. Implementing strategies for hepatitis B vaccination. Saudi J. Kidney Disease Transplantaion. 21: 10-22.
23. Khedmat, H., F. Fallahian, H. Abolghasemi, S.M. Alavian, B. Hajibeigi, S.M. Miri and A.M. Jafari, 2007. Seroepidemiologic study of hepatitis B virus, hepatitis C virus, human immunodeficiency virus and syphilis infections in Iranian blood donors. Pakistan J. Biological Sci., 10(24): 4461-6.
24. Russmann, S., E.A. Dowlatshahi, S. Habicht, J. Reichen and H. Zimmermann, 2007. Prevalence and associated factors of viral hepatitis and transferrin elevations in 5036 patients admitted to the emergency room of a Swiss university hospital: cross-sectional study. BMC Gastroenterol., 5: 5-7.
25. Alavian, S.M. and F. Fallahian, 2009. F. Epidemiology of Hepatitis C in Iran and the World. Shiraz E-Medical J., 10: 4.
26. Khedmat, H., F. Fallahian, H. Abolghasemi, S.M. Alavian, B. Hajibeigi, S.M. Miri and A.M. Jafari, 2010. Seroepidemiologic Study of Hepatitis B Virus, Hepatitis C Virus, Human Immunodeficiency Virus and Syphilis Infections in Iranian Blood Donors. Sci. Alert.,
27. Mohme, 2010. Ministry of Health and Medical Education, Center of Diseases Management, Sexually Transmitted Disease and AIDS Office. Statistics of sentinel site surveys. January 2010, (Unpublished data).
28. Khedmat, H., S.M. Alavian, S.M. Miri, M. Amini, H. Abolghasemi, B. Hajibeigi, F. Alaeddini and F. Fallahian, 2009. Trends in Seroprevalence of Hepatitis B. Hepatitis, C. HIV and Syphilis Infections in Iranian Blood Donors from 2003 to 2005. Hepatitis Monthly, 9(1): 24-28
29. Poorolajala, J., M. Mahmoodia, R. Majdzadeha, S. Nasseri-Moghaddamb, A. Haghdoost and A. Fotouhia, 2010. Long-term protection provided by hepatitis B vaccine and need for booster dose: A meta-analysis. Vaccine, 28(3): 623-631.
30. Ghorbani, G.A., S.M. Alavian and H.R .Ghadimi, 2008. Long term effects of one or two doses of hepatitis B vaccine in adults after five years. Pakistan J. Biological Sci., 11(4): 660-663.

31. Centers for Disease Control and Prevention,2009. Surveillance for Acute Viral Hepatitis-United States, 2007. Surveillance Summaries, May 22, 2009. MMWR 2009; 58(No. SS-3).
32. Lavanchy, D., 2004. Hepatitis B epidemiology, disease burden, treatment and current and emerging prevention and control measures. J. Viral Hepatitis, 11: 97-107.
33. Madani, T.A., 2007. Trend in incidence of hepatitis B virus infection during a decade of universal childhood hepatitis B vaccination in Saudi Arabia. Trans. R. Soc. Trop. Med. Hyg., 101: 278-83.