

Review Article

Occupational hazards to dental staff

Jamshid Ayatollahi¹, Fatemah Ayatollahi², Ali Mellat Ardekani³, Rezvan Bahrololoomi⁴, Jahangir Ayatollahi⁵, Ali Ayatollahi⁶, Mohammad Bagher Owlia⁷

¹Infectious and Tropical Diseases Research Center, Departments of ³Neurology, ⁵Ophthalmology and ⁷Internal Medicine, Shahid Sadoughi University of Medical Sciences, Yazd, ²Post graduate student of Endodontics, ⁴Department of Social Dentistry, School of Dentistry, Shahid Sadoughi University, Yazd, ⁶Optometrist, Shahid Beheshti University of Medical Science, Tehran, Iran

ABSTRACT

Dental professionals are predisposed to a number of occupational hazards. These include exposure to infections (including Human Immunodeficiency Virus and viral hepatitis); percutaneous exposure incidents, dental materials, radiation, and noise; musculoskeletal disorders; psychological problems and dermatitis; respiratory disorders; and eye insults. Percutaneous exposure incidents remain a main concern, as exposure to serious infectious agents is a virtual risk. Minimizing percutaneous exposure incidents and their consequences should continue to be considered, including sound infection control practices, continuing education, and hepatitis B vaccination. Basically, for any infection control strategies, dentists should be aware of individual protective measures and appropriate sterilization or other high-level disinfection utilities. Strained posture at work disturbs the musculoskeletal alignment and leads to stooped spine. The stooped posture also involved certain groups of muscles and joints. This may lead to diseases of the musculoskeletal system. Continuous educating and appropriate intervention studies are needed to reduce the complication of these hazards. So, it is important for dentists to remain constantly up-to-date about measures on how to deal with newer strategies and dental materials, and implicates the need for special medical care for this professional group.

Key Words: Dental staff, dentist, occupational disease

Received: February 2011
Accepted: July 2011

Address for correspondence:
Dr. Ali Mellat Ardekani,
Infectious and Tropical
Diseases Research Center,
Shahid Sadoughi Hospital -
Safaeieh, Yazd, Iran.
E-mail: ali_mellat@ssu.ac.ir

INTRODUCTION

Dentistry is considered by the practitioners and most of the public as being extremely hazardous. The hazards include the following:

- Infectious hazards: Needles and other sharp objects, spatter, and aerosols can transmit viral infections such as life-threatening infections such as acquired immunodeficiency syndrome and hepatitis B.^[1,2] Bacterial infections also play an important role.^[3] The leading causes that should be concerned are syphilis and tuberculosis.^[4]

- Psychological hazards: Stress is the leading psychological condition that occurs in the dental profession. Many studies implicate that dentists perceive their profession as more stressful than other jobs.^[5,6] Negative picture induced by the media of dentistry as a profession filled with dangers may be the leading causes.^[5]
- Allergic reactions: Gloves containing latex are the main causes of the allergic skin irritation, but dental materials, detergents, lubricating oils, solvents, and X-ray processing chemicals could lead to an allergic skin reaction.^[7]
- Physical hazards: These include musculoskeletal complications which have direct relation to dentistry procedure, like postural situations that may increase the risk of twisting and contorting the body, varicose, etc.^[8]
- Mercury health hazard: It has been proved that high mercury vapor high dose exposure can lead to biological and neurological insults.^[9] Sealed

Access this article online

Quick Response Code:



Website: www.drj.ir

DOI: 10.4103/1735-3327.92919

amalgam capsules use with lower mercury level, water irrigation and high suction, good ventilation and proper collection, and discarding of amalgam have substantially diminished the mercury dangers.^[9,10]

- Ionizing radiation: Taking X-ray machines in the dental office predispose dentists to suffer from ionizing radiation.^[10,11]
- Non-ionizing radiation: This has recently become a concern since the use of composites and other resins, next to the use of lasers in dentistry procedures, which has added another potential hazard to eye and other tissues that may be directly exposed.^[10]
- Anesthetic gases in the dental office: Using nitrous oxide gas regularly over an extended period of time may contain hazard.^[12]

Concerning prevention, the global literature focuses strictly on control of infections and appropriate management of potentially infected materials, owing to the high profile of dentistry regarding infection transmission. Barrier utilities such as gloves, masks, protective eye wear, high power suction, and good ventilation reduce aerosols and vapor hazards.^[13] Hypoallergenic non-latex gloves can decline latex allergy. Lead aprons, periodic maintenance of the X-ray machine and radiation level sensors deal with radiation dangers.^[7,11] The current paper reviews studies relating to occupational health problems in dental practice.

INFECTION

Dental practitioners as other healthcare workers confront a identified risk of occupational exposure to blood-borne pathogens like the Human Immunodeficiency Virus (HIV), the hepatitis B virus (HBV), and the hepatitis C virus (HCV).^[1,2] In dentistry, sharp injuries occur because of a small operating field, frequent patient movement, and the variety of sharp instruments used in dental procedure.^[12-14] The risk of exposure to blood-borne infections during the clinical dental training, consequences of non-reporting, and lack of appropriate follow-up or even infection should constantly be evaluated by dental institutions.^[14]

The risk of HIV transmissions to healthcare workers approximately range from 0.2 to 0.3% for parenteral exposures and 0.1% or less for mucosal exposures.^[15,16] A report published by the Centers for disease control and prevention (CDC) studied

the 208 dental exposures (percutaneous, mucous membrane, and prolonged skin exposures) reported to the CDC from 1995 to 2001, 13% had HIV-positive source patients and did not lead to a seroconversion (75% of exposed individuals took the three-drug PEP regimen for variable lengths of time).^[17] Percutaneous exposure to HBV containing transmission risk about 2% for HBeAg-negative and about 30% for HBeAg-positive blood.^[14] Despite reducing the risk for HBV transmission among healthcare workers by effective HBV vaccination programs, measuring of anti-HBs antibody response after HBV vaccination is essential for all vaccinated individuals with high-risk professions.^[1,2,14]

HCV transmission risk is 1.8% and is the most serious viral hepatitis infection because of its ability to produce chronic infection in as many as 85% of those infected.^[18-23] The U.S. Public Health Service recommendations for HCV exposures implicate precise follow-up of the exposed practitioners and referral for appropriate therapy if an infection occurs.^[24]

MUSCULOSKELETAL

During dentistry procedure, the dentist's posture is strained (while standing and sitting close to a patient who remains in a sitting or lying position), which induce stress injury on musculoskeletal system. This occurs in 37.7% of work time.^[25]

Musculoskeletal complications among dentists is prevalent like other healthcare workers and well documented.^[26-29] Most dentists (87.2%) indicated at least one symptom of musculoskeletal diseases in the past last year.^[30] A study in Greece indicated that 62% of dentists complained at least one musculoskeletal complaint, 30% chronic complaints, and 16% sought medical care. Low back pain is the most prevalent musculoskeletal complaint.^[27,31] Severe chronic back pain is reported in more than 25% of dentists with back pain.^[27] Sitting position induced more severe low back pain than position alternating between sitting and standing.^[32-34]

Hand/wrist complaints among dentists and especially dental hygienists are highly prevalent.^[27,35-40] Hand/wrist complaints follow low back disorders^[27,39] and result in a significant higher chronicity than any other complaint.^[27] Despite carpal tunnel syndrome, prevalence among dentists is not very high, about 5%,^[38] 56% of dental hygienists complain some

symptoms of carpal tunnel syndrome.^[40]

Neck and shoulder complaints were less prevalent than back pain. Musculoskeletal disturbances was frequent, 62% of dentists reported at least one musculoskeletal complaint, 35% reported at least two musculoskeletal complaints, 15% reported at least three musculoskeletal complaints, and 6% reported spells of all four complaints in the past year.^[27]

Dentists with back pain more often complained neck pain and hand/wrist pain than those without back pain. Neck and hand/wrist pain was strongly associated since 50% of subjects with neck pain also experienced hand/wrist pain in the past 12 months. Age and gender were significant only for neck pain. Senior people and women more disturbed from neck pain.^[26,27]

Educational level and continuous working were significant risk factors for shoulder pain. Living alone was significant for neck and shoulder pain. Increased age was related to all complaints chronicity. Female gender was significantly related to chronic back and shoulder pain. Comorbidities were more among those with higher physical load, lower job control, and working long hours.^[27]

Musculoskeletal pain may be induced by mechanical vibrations affecting the organism through the upper limbs and causing changes in the vascular, neural, and osteoarticular systems. These changes may produce an occupational disease called vibration syndrome. But based on available literature, it cannot be considered any direct link between vibrations emitted by the working dental instruments and the incidence of symptoms characteristic of the vibration syndrome.^[29] Musculoskeletal pain and disorders affect dental operators have multifactorial causes.

There is relationship between the biomechanics of seated working postures, repeated unidirectional twisting of the trunk, working in one position for prolonged periods, operator's flexibility and core strength, operators knowing how to properly adjust ergonomic equipment, and physiological damage or pain.^[28,41] Studies indicate that protocols preventing the multifactorial problem of dentists developing musculoskeletal disturbances such as malposition and posture and considering ergonomics are helpful.^[28,38]

STRESS

Not only physical impairments, but job-related psychological disorders may also affect dentist's health.

Risk factors affect dentist's psychological conditions that include job-related stress, tension, depression, emotional exhaustion, and depersonalization.

Dental practice is stressful. Dentists have to overcome many stressors in their personal and professional lives.^[42] There are some evidences that suggest dentists suffer a high level of job-related stress.^[33,43-46]

Eighty-three percent of dentists believed that dentistry is "very stressful,"^[43] nearly 60% believed that dentistry is more stressful than other professions.^[47] Dentists indicated running behind schedule, causing pain, and heavy work load, late and anxious patients as well as being the most intense stressors in their work.^[47,48] Dentists, who reported that dental anxiety was primarily the result of general psychological problems in patients, usually had solo practices older than 18 years and reported high perceived stress.^[47]

There was no difference between levels of stress among dental specialties. Working in the field of pediatric dentistry was related to the highest median levels of stress, though this result was not significant.^[49]

A large number of factors are responsible for stress situations including low autonomy, work overload, and inappropriate relation between power and responsibility. Teaching role in addition to clinical role may increase the levels of stress, but there is also evidence that this dual role may decline job-related stress.^[50]

Understanding and controlling of the underlying physiological mechanisms precisely are necessary to develop and implement a comprehensive approach to minimize the risks of the work-related injuries. Maintaining good physical and mental health is emphasized to dentists to enjoy and be satisfied with their professional and personal lives.

LATEX

The routine use of latex gloves and other personal protective equipment significantly reduced the chance of HIV/blood-borne disease transmission; however, as more and more Healthcare Workers (HCWs) were exposed to latex-containing products on a regular basis, problems began to be reported.

The etiology of latex sensitivity is based on a reaction to the plant containing allergenic proteins in natural rubber. Referred to as Type I allergy to natural rubber latex protein, allergic reactions can be severe sometimes fatal.

The American Dental Association (ADA) began investigating the prevalence of Type I latex hypersensitivity in dental personnel in 1994. At that time, over 2 000 dentists, hygienists, and assistants volunteered for testing at the 1994 and 1995 ADA Annual Sessions. Results showed that 6.2% of participants tested were positive for Type I latex hypersensitivity.^[51,52] Data from 1996 to 2001 from this ongoing cross-sectional study showed a decline in prevalence from 8.5% to 4.3%.^[51]

This decline is related to the use of a better quality of latex gloves with lower allergen content.^[51,53-55] In order to reduce the risk of latex product-associated adverse reactions in both HCWs and patients, federal regulatory agencies such as the Food and Drug Administration (FDA), The National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), and the CDC have instituted policies and recommendations regarding appropriate selection of products, work practices to reduce risk, employee education, and the monitoring of allergic symptoms. For example, the FDA requires all medical/dental products and/or devices that contain latex to be clearly labeled “contains latex.” In the newly released Guidelines for Infection Control in Dental Healthcare Settings, 2003, the CDC suggests a number of protocols to decline and manage latex sensitivity and associated adverse reactions in dentistry.^[51]

Accordingly,

- Dental healthcare providers (DHCP) should be familiar with the signs and symptoms of latex sensitivity.
- A physician should evaluate DHCP experiencing symptoms of latex allergy, because further exposure could result in a serious allergic reaction.
- A diagnosis is made through the medical history, physical examination, and diagnostic tests.
- Procedures should be in place for minimizing latex-related health problems in DHCP and patients while protecting them from infectious materials. These procedures include reducing exposures to latex-containing materials, using appropriate work practices, training and educating DHCP, monitoring symptoms, and substituting non-latex products when appropriate.

EYE

In the modern dental practice, safety concerns must be paramount to avoid injury and litigation. The

principle of “do no harm” must also apply to patient for injury prevention. Similarly, dentists must be vigilant in wearing personal protective equipment to ensure their own personal safety and thus remain healthy and active in their profession. Because the majority of dental procedures are accomplished with instruments being passed over or near the patient’s face and with aerosols and chemicals frequently in close proximity, both patients and dentists should wear eye protection. Curing lights are also a potential hazard to those who place restorative resins due to phototoxic and photoallergic reactions originating from absorbed radiation.^[56]

Visual field constriction related to mercury exposure is reported.^[57] Color vision examination has been shown as a sensitive indicator of subtle neurotoxic effects from exposure to solvents and heavy metals.^[58,59]

In 1991, the U.S. OSHA mandated protective eyewear use reducing the risk from blood-borne pathogens during procedures in which splatter or the use of aerosols might occur.^[60] The CDC’s latest update simply states “Protective eyewear for patients can shield their eyes from splatter and debris during dental procedures.” Infrequently, the dental literature supports the use of safety eyewear during restorative procedures to reduce the risk of ocular injuries.^[61,62]

EAR

Dentists are at risk for noise-induced hearing loss. Although hearing loss may not be symptomatic, the first complication and the reason for seeking a hearing evaluation may be tinnitus.^[63]

Noise is always present during the work of dental staff divided into distracting noise and destructive noise. This division results from the variety of parameters determining sound hazards and their influence on the human organism.

The sources of dental sounds inducing hearing loss that can be diminished are high-speed turbine handpieces, low-speed handpieces, high-velocity suction, ultrasonic instruments and cleaners, vibrators and other mixing devices, and model trimmers. At last, it should be worth mentioning that air conditioners and office music played too loud.^[64,65]

REFERENCES

1. Ayatollahi J, Bahrololoomi R, Ayatollahi F. Vaccination of dentist and other oral health care providers. *J Den Med* 2005;18:5-14.

2. Ayatollahi J, Sharifi MR, Sabzi F, Zare AR. Blood level anti-HBS due to HB vaccine in health care personnel of Shahid Sadoughi Hospital-Yazd. *Iranian Journal of Obstetrics, Gynecology and Infertility* 2004;7:48-51.
3. Leggat PA, Kedjarune U. Bacterial aerosols in the dental clinic: A review. *Int Dent J* 2001;51:39-44.
4. Samaranayake P. Re-emergence of tuberculosis and its variants: Implications for dentistry. *Int Dent J* 2002;52:330-6.
5. Rodríguez Vázquez LM, Rubiños López E, Varela Centelles A, Blanco Otero AI, Varela Otero F, Varela Centelles P. Stress amongst primary dental care patients. *Med Oral Patol Oral Cir Bucal*. 2008 Apr 1;13:E253-6.
6. Winwood PC, Winefield AH, Lushington K. The role of occupational stress in the maladaptive use of alcohol by dentists: A study of South Australian general dental practitioners. *Aust Dent J* 2003;48:102-9.
7. Rubel DM, Watchorn RB. Allergic contact dermatitis in dentistry. *Aust J Dermatol* 2000;41:63-9.
8. Rundcrantz BL, Johnsson B, Moritz U. Pain and discomfort in the musculoskeletal system among dentists. A prospective study. *Swed Dent J* 1991;15:219-28.
9. Al-Khatib IA, Darwish R. Assessment of waste amalgam management in dental clinics in Ramallah and Al-Bireh cities in Palestine. *Int J Environ Health Res* 2004;14:179-83.
10. Szymanska J. Occupational hazards of dentistry. *Ann Agric Environ Med* 1999;6:13-9.
11. Shuhaiber S, Einarson A, Radde IC, Sarkar M, Koren G. A prospective controlled study of pregnant veterinary staff exposed to inhaled anesthetics and X-rays. *Int J Occup Med Environ Health* 2002;15:363-73.
12. Henderson KA, Matthews IP. Environmental monitoring of nitrous oxide during dental anaesthesia. *Br Dent J* 2000;188:617-9.
13. Kumar RS, Manish GN, Ferreira AM. Occupational hazards among dental surgeons. *Indian J Occup Environ Med* 2000;4:139-41.
14. Ayatollahi J. Needle-stick injuries in a general hospital: Continuing risk and under reporting. *Ann Iranian Med* 2006;3:47-50.
15. Bravo IM, Correnti M, Escalona L, Perrone M, Brito A, Tovar V, *et al.* Prevalence of oral lesions in HIV patients related to CD4 cell count and viral load in a Venezuelan population. *Med Oral Patol Oral Cir Bucal* 2006;11:E33-9.
16. Gerberding JL. Occupational exposure to HIV in health care settings. *N Engl J Med* 2003;348:826-33.
17. Cleveland JL, Barker L, Gooch BF, Beltrami EM, Cardo D; The National Surveillance System for Health Care Workers Group of the Centers for Disease Control and Prevention. Use of HIV post-exposure prophylaxis by dental health personnel: An overview and updated recommendations. *J Am Dent Assoc* 2002;133:1619-26.
18. Mitsui T, Iwano K, Masuko K. Hepatitis C virus infection in medical personnel after needlestick accidents. *Hepatology* 1992;16:1109-14.
19. Zuckerman J, Clewley G, Griffiths P, Cockroft A. Prevalence of hepatitis C antibodies in clinical health-care workers. *Lancet* 1994;343:1618-20.
20. Lanphear BP, Linnemann CC Jr, Cannon CG. Hepatitis C virus infection in health care workers: Risk of exposure and infection. *Infect Control Hosp Epidemiol* 1994;15:747-50.
21. Puro V, Petrosillo N, Ippolito G. Italian study group on occupational risk of HIV and other bloodborne infections: Risk of hepatitis C seroconversion after occupational exposure in health-care workers. *Am J Infect Control* 1995;23:273-7.
22. Younai FS. Health care-associated transmission of hepatitis B and C viruses in dental care (Dentistry). *Clin Liver Dis* 2010;14:93-104.
23. Butt AK, Khan AA, Khan SY, Sharea I. Dentistry as a possible route of hepatitis C transmission in Pakistan. *Int Dent J* 2003;53:141-4.
24. Updated U.S. Public Health Service. Updated U.S. public health service guidelines for the management of occupational exposures to HBV, HCV and HIV and recommendations for post-exposure prophylaxis. *MMWR Recomm Rep* 2001;50:1-52.
25. Fish DR, Morris-Allen DM. Musculoskeletal disorders in dentists. *NY State Dent J* 1998;64:44-8.
26. Gorter RC, Eijkman MAJ, Hoogstraten J. A career counseling program for dentists: Effects on burnout. *Patient Educ Couns* 2001;43:23-30.
27. Alexopoulos EC, Stathi IC, Charizani F. Prevalence of musculoskeletal disorders in dentists. *BMC Musculoskeletal Disord* 2004;5:16.
28. Valachi B, Valachi K. Mechanisms leading to musculoskeletal disorders in dentistry. *J Am Dent Assoc* 2003;134:1344-50.
29. Szymanska J. Dentist's hand symptoms and high-frequency vibration. *Ann Agric Environ Med* 2001;8:7-10.
30. Leggat PA, Smith DR. Musculoskeletal disorders self-reported by dentists in Queensland, Australia. *Aust Dent J* 2006;51:324-7.
31. Milerad E, Ericson MO, Nisell R, Kilbom A. An electromyographic study of dental work. *Ergonomics* 1991;34:953-62.
32. Newell TM, Kumar S. Comparison of instantaneous and cumulative loads on the low back and neck in orthodontists. *Clin Biomech (Bristol, Avon)* 2005;20:130-7.
33. Myers HL, Myers LB. 'It's difficult being a dentist': Stress and health in the general dental practitioner. *Br Dent J* 2004;197:89-93; discussion 83; quiz 100-1.
34. Ratzon NZ, Yaros T, Mizlik A, Kanner T. Musculoskeletal symptoms among dentists in relation to work posture. *Work* 2000;15:153-8.
35. Szymanska J. Disorders of the musculoskeletal system among dentists from the aspect of ergonomics and prophylaxis. *Ann Agric Environ Med* 2002;9:169-73.
36. Hayes MJ, Cockrell D, Smith DR. A systematic review of musculoskeletal disorders among dental professionals. *Int J Dent Hyg* 2009;7:159-65.
37. McManus IC, Keeling A, Paice E. Stress, burnout and doctors' attitudes to work are determined by personality and learning style: A twelve year longitudinal study of UK medical graduates. *BMC Med* 2004;2:29.
38. Hamann C, Werner RA, Franzblau A, Rodgers PA, Siew C, Gruninger S. Prevalence of carpal tunnel syndrome and median mononeuropathy among dentists. *J Am Dent Assoc* 2001;132:163-70; quiz 223-4.
39. Lund AE. How do you rate your general health? *J Am Dent Assoc* 2002;133:1478.
40. Lalumandier JA, McPhee SD. Prevalence and risk factors of hand problems and carpal tunnel syndrome among dental hygienists. *J Dent Hyg* 2001;75:130-4.

41. Valachi B, Valachi K. Preventing musculoskeletal disorders in clinical dentistry: Strategies to address the mechanisms leading to musculoskeletal disorders. *J Am Dent Assoc* 2004; 135:278.
42. Newton JT, Allen CD, Coates J, Turner A, Prior J. How to reduce the stress of general dental practice: The need for research into the effectiveness of multifaceted interventions. *Br Dent J* 2006;200:437-40.
43. Baran RB. Myers briggs type indicator, burnout, and satisfaction in illinois dentists. *Gen Dent* 2005;53:228-34; quiz 235.
44. Gilmour J, Stewardson DA, Shugars DA, Burke FJ. An assessment of career satisfaction among a group of general dental practitioners in Staffordshire. *Br Dent J* 2005;198:701-4.
45. Goebring C, Bouvier Gallacchi M, Kunzi B, Bovier P. Psychosocial and professional characteristics of burnout in Swiss primary care practitioners: A cross-sectional survey. *Swiss Med Wkly* 2005;135:101-8.
46. Rees DW. Work-related stress in health service employees. *J Managerial Psychol* 1995;10:4-11.
47. Moore R, Brodsgaard I. Dentists' perceived stress and its relation to perceptions about anxious patients. *Community Dent Oral Epidemiol* 2001;29:73-80.
48. Roger EA. Stress-related suicide by dentists and other health care workers. *J Am Dent Assoc* 2001;132:786-94.
49. Newton JT, Mistry K, Patel A, Patel P, Perkins M, Saeed K. Stress in dental specialists: A comparison of six clinical dental specialties. *Prim Dent Care* 2002;9:100-5.
50. Rutter H, Herzberg J, Paice E. Stress in doctors and dentists who teach. *Med Educ* 2002;36:543-9.
51. Stoeva L. The prevalence of latex gloves-related complications among dental student. *J of IMAB* 2011;17:91-2.
52. Hamann CP, Turjanmaa K, Rietschel R, Rietschel R, Siew C, Owensby D, *et al.* Natural rubber. Latex hypersensitivity: incidence and prevalence of type I allergy in the dental professional. *J Am Dent Assoc* 1998;129:43-54.
53. Turjanmaa K, Kanto M, Kautiainen H, Reunala T, Palosuo T. Long-term outcome of 160 adult patients with natural rubber latex allergy. *J Allergy Clin Immunol* 2002;110(2 Suppl):S70-4.
54. Hunt LW, Kelkar P, Reed CE, Yunginger JW. Management of occupational allergy to natural rubber latex in a medical center: The importance of quantitative latex allergen measurement and objective follow-up. *J Allergy Clin Immunol* 2002;110(2 Suppl):S96-106.
55. Saary MJ, Kanani A, Alghadeer H, Holness DL, Tarlo SM. Changes in rates of natural rubber latex sensitivity among dental school students and staff members after changes in latex gloves. *J Allergy Clin Immunol* 2002;109:131-5.
56. Bruzell Roll EM, Jacobson N, Hensten-Pettersen A. Health hazards associated with curing light in the dental clinic. *Clin Oral Investig* 2004;8:113-7.
57. Clarkson TW. The toxicology of mercury. *Crit Rev Clin Lab Sci* 1997;34:369-403.
58. Gobba, F. Color vision: A sensitive indicator of exposure to neurotoxins. *Neurotoxicology* 2000;21:857-62.
59. Ventura DF, Costa MT, Costa MF, Berezovsky A, Salomão SR, Simões AL, *et al.* Multifocal and full-field electroretinogram changes associated with color-vision loss in mercury vapor exposure. *Vis Neurosci* 2004;21:421-9.
60. Centers for Disease Control. Guidelines for infection control in dental health care settings, 2003. *MMWR* 2003;52:17.
61. Miller C. Make eye protection a priority to prevent contamination and injury. *RDH* 1995;15:40-2.
62. Szymanska J. Work-related vision hazards in the dental office. *Ann Agric Environ Med* 2000;7:1-4.
63. Garner GG, Federman J, Johnson A. Noise induced hearing loss in the dental environment: An audiologist's perspective. *J Georgia Dent Assoc* 2002;17-19.
64. Szymanska J. Work-related noise hazards in the dental surgery. *Ann Agric Environ Med* 2000;7:67-70.
65. Hyson JM Jr. The air turbine and hearing loss. Are dentists at risk? *J Am Dent Assoc* 2002;133:1639-42.

How to cite this article: Ayatollahi J, Ayatollahi F, Ardekani AM, Bahrololoomi R, Ayatollahi J, Ayatollahi A, *et al.* Occupational hazards to dental staff. *Dent Res J* 2012;9:2-7.

Source of Support: Nil, **Conflict of Interest:** None declared.