

# Occupational hazards in dentistry.

## An e-survey

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### Abstract

*Dental professionals are susceptible to a number of occupational hazards. Relying on relevant literature, this paper discusses selected occupational hazards, including occupational biohazards, stressful situations, latex hypersensitivity as well as factors leading to musculoskeletal system diseases. Dentists belong to a professional group potentially exposed to harmful biological factors, which most often are infectious microorganisms, less frequently allergenic or toxic microorganisms. The fundamental routes of spreading harmful microorganisms are blood-borne, saliva-droplet, direct contact with a patient and with infected equipment, and water-droplet infections. In this paper, the current status of knowledge on microbiological hazards in a dentist's work is presented, including groups of microorganisms, such as prions, viruses, bacteria, fungi and protozoa, to which a dentist is or may be exposed.*

### Introduction

During their professional work, dentists are exposed to a significant number of occupational hazards such as the potential contamination of infectious microorganisms, as there are four basic routes of spreading harmful microorganisms: 1) Blood-borne route, 2) Saliva-droplet route, 3) Direct contact, and 4) Water-droplet route. Moreover, dentists are at high risk for developing diverse musculoskeletal problems as well as hearing and vision diseases due to the constant exposure to noise (turbines,

saliva ejectors, etc.) and to artificial lighting and focusing on a limited surgical area correspondingly.<sup>3</sup>

### Biological health hazards

In the case of direct contamination as a result of an accidental bite by the patient or through a needle, the greatest risk for the dentist are the viruses<sup>3</sup>: Hepatitis B virus (HBV) is highly infectious, easily transmitted through blood and saliva, and highly resistant to environmental agents, disinfection and sterilization. The dentist



may be HBV-infected through needlesticks or other accidental percutaneous injuries with sharp instruments, and through an aerosol of blood. The virus causes asymptomatic infections, acute or chronic, which may lead to cirrhosis.<sup>2, 7</sup> It is estimated that infections with type B viral liver inflammation occur among dentists at least three times more often than in the general population, and among dental surgeons—at least six times more frequently. General vaccination reduced the number of occupational infections with hepatitis B. Hepatitis C virus (HCV) is a blood-borne virus containing RNA, epidemiologically similar to HBV. HCV infection remains asymptomatic in 90% of the cases and may de-

velop into a chronic liver inflammation and eventually cirrhosis and chronic liver cancer.<sup>7</sup> HCV is less infectious than HBV.<sup>2, 7</sup> The Virus causing the acquired immunodeficiency syndrome AIDS disease (HIV) is an RNA-containing retrovirus, transmitted in a blood-borne mode and through sexual contact. It attacks human CD-4 lymphocytes, causing a drastic immunity drop and death, most frequently as a result of infection with opportunistic microorganisms, normally indifferent to human health. Some of the most significant HIV oral manifestations are oral hairy leukoplakia, candidiasis and Necrotizing Ulcerative Gingivitis.<sup>3,7</sup> The main sources of indirect infection are: saliva, gingival fluid, natural organic dust particles (dental caries tissue) mixed with air and water.<sup>3</sup> The basic protective measures for patients and doctors against infectious viruses transmission are: 1) gloves, mask, glasses, 2) autoclave usage, 3) disposable units usage in case of treatment of a known seropositive patient, 4) permanent coverage of handpieces with a baggie.<sup>7</sup>

### **Stress**

Stress comprises a frequent risk factor during dental practice, the dental profession is categorized among the most stressful ones. The psychological aspects of the dentist–patient relationship as well as the actual dental action (e.g. anaesthetisation, emergencies) are the main sources of dental professional stress.



### **Latex hypersensitivity**

Latex gloves and masks might lead to allergic reactions as 2.8–17% of the employees of health service are allergic to latex. The main risk factor of immediate allergies is the repeated exposure to latex products. An alternative to latex are vinyl gloves.<sup>38</sup>

### **Musculoskeletal disorders and diseases of the peripheral nervous**

At work, the dentist adopts a strained posture (both while standing and sitting close to a patient who remains in a sitting or lying position), which causes an over-stress of the spine and limbs that negatively affects the musculoskeletal system and the peripheral nervous system. Thus, commonly dentists suffer from back pain syndromes and neck discopathy.<sup>3, 19, 20, 21</sup>

### **Laser radiation hazards**

General stomatology frequently uses laser radiation of low and medium intensity that induces certain cellular chemical and metabolic reactions usually described as biostimulating. The effect is absence of pain, elimination of inflammation and

stimulation.<sup>22, 23</sup> In dentistry good results are reported from laser usage during treatment of pulpitis, dentin hypersensitivity, periapical tissues pathologies, recurrent aphthosis, maxillary sinusitis, postextraction wounds, alveolitis, pericoronitis, inflammation and neuralgia of the trigeminal nerve, diseases of the maxillary joint, periodontitis. However, laser radiation might be a health hazard as the eye and the skin are the organs most exposed to the light.<sup>24</sup>

### **Materials and methods**

A questionnaire-based e-survey was conducted among 200 dentists, with an age ranging from 21 to 68, regarding their potential professional exposure to the health hazards mentioned above. The results showed the distribution of dentists according to their demographic data as asked about gender, age, country, work experience, working sectors and working hours per week. Also, we asked them if they have had one or more of the occupational hazards like HCV, HBV, HIV, air borne disease, muscle pain, chemical adverse effect, radiation hazards, skin allergy, sharp injury and stress.

### **Discussion**

Modern dentistry has been described to be one of the most hazardous of all occupations.<sup>26</sup> Our results showed no significant difference regarding the prevalence of HBV, HCV, HIV, air-borne infection, radiation

hazards, and sharp injuries. However, statistical significance was observed in the prevalence of muscle pain, materials adverse effects, skin allergies, and stress. Results showed that three male dentists (1.5 %) out of 200 were reported to be positive for hepatitis B virus (HBV) and another three for hepatitis C virus (HCV). Also, four males of the same occupation (2 %) were reported positive for human immunodeficiency virus (HIV). We compared this to the results of other studies that showed that seven males and six females had (HBV), (HCV) and (HIV), with the females having the highest rate. Primary concern should be given to these pathogens, as they are easily transmitted through blood and other body fluid exposures across a wide variety of occupations.<sup>28</sup> In another study in Palestine, the dentists were well aware of the biological hazards, especially the dangerous ones (HIV and hepatitis B virus), as it was mentioned that HIV is 13 % less than hepatitis B virus which is only 38 %. Numerous studies have shown that the incidence of hepatitis B developing after needle-stick injuries from hepatitis B infected patients is approximately 20 % compared to 0.4 % for the HIV similar exposure. In a study conducted on 1,309 dental professionals it was noticed that 15 % of the participants who practiced in locations with increased reported Aids cases were contaminated, while 94 % of them were reported as accidental puncturing of the skin with dental instruments.<sup>32</sup>

In order to estimate the risk of HCV infection among primary dental care workers in the West of Scotland, occupational and personal risk data were collected in parallel with a blood specimen. The overall prevalence of HCV antibodies was 0.1 %, which was not statistically different compared to the local population.<sup>33</sup>

In another study it was observed that 29 males and 20 females had a sharp injury, while other investigators found out that 78.5 % of the participants damaged their gloves at least once during a clinical procedure in the previous 12-month period and 27.7 % had experienced at least one sharp or needle stick injury during the 12-month period. 16.1 % involved an injury from a contami-



nated instrument that had been previously used on a patient. The most common dental appliances that are likely to cause sharp injuries were 14.4 % needles and 10.2 % burs.<sup>30</sup> Regarding muscle pain, the results reported a higher rate among males than females, due to a wrong position and overstress.<sup>3, 19, 20, 21</sup>

In a Danish study 50 % of the dentists reported neck & lower back pain and 56 % shoulder pain. Similarly, a study from Israel observed that 55 % of the dentists had neck & lower back pain while a relevant study from Australia reported that 82 % of the dentists complained about musculoskeletal disorders. It is worth mentioning that self-employed dentists may suffer from direct loss of income if they are unable to work due to their physical limitations caused by back and neck pain and that 21.62 % missed work because of neck pain and 24.66 % because of back pain. On the other hand, only 25.32 % and 37.33 % sought medical help for neck and back pain respectively.<sup>35</sup> Considering Materials' Adverse Effect, it was found that nine males and twelve

females had adverse effects, which was higher among females (total 10.5%).

Another study regarding hand eczema and symptoms associated with dental materials showed that 63% of the subjects had allergic contact dermatitis (ACD) and 23% had irritative contact dermatitis.<sup>34</sup> Previous studies revealed that 2.8–17% of the employees at health service are allergic and among Palestine dentists, 8% were reported to have the same problem mainly caused by the use of latex gloves dusted with cornstarch powder.<sup>31, 3</sup> Regarding radiation hazards, eight males and two females were reported to have laser radiation hazards, the rate is higher among males (total 5%) than among females. This may be due to the exposure to its harmful effect without proper application of protection measures. Similarly, another study in Palestine showed a similar result of 5%.<sup>31</sup> Fortunately, risks from radiation appears to have been effectively reduced by most dentists due to a previous study from Thailand.<sup>26</sup>

Stress study results showed that 78 males and 61 females were stressed, with a higher rate among females (total 69.5%) than males. The stress results of a study performed in Palestine was 100% of the total participants, which coincides with the international data indicating that dentists perceive their profession as highly stressful.<sup>31</sup> Finally, regarding vaccination, this survey showed that 144 participants

received vaccination for HBV (total 72%), while in Italy 89.2% of the dentists received vaccination.<sup>29</sup>

### Conclusion and recommendations

Occupational hazards in the dental field represent a serious risk that should be considered while working in that field. Stress, viral infection and musculoskeletal disorders seem to be the most common among them and preventive measures should be taken.

#### **Our recommendations are summarized as follows:**

- 1. Awareness of occupational hazards among dental professionals should be emphasized.**
- 2. Infection control measures should be applied in dental clinics.**
- 3. Vaccination against HBV should be mandatory.**
- 4. Dentists should constantly adopt an ergonomic working position.**

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