

## Full Length Research Article

# Risk factors in Dentistry Occupation

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Occupational ill health and diseases are known to occur, but few people have the knowledge and skill to prevent them. Dental professionals may be at risk for exposure to numerous workplace hazards. These hazards include but are not limited to the spectrum of blood borne pathogens, pharmaceuticals and other chemical agents, human factors, ergonomic hazards, noise and vibration. Accidents and diseases in the workplace have generally been seen as part and parcel of everyday life, bad luck, carelessness. To know and understand the causes of occupational hazards are very important to stop or prevent them

**Key words:** Methyl Methacrylate, Hazards, Infection, Posture.

## INTRODUCTION

Occupational hazard can be defined as a risk to a person usually arising out of employment. It can also refer to a work, material, substance, process, or situation that predisposes, or itself causes accidents or disease, at a work place. Dentistry is one of the careers which have so many occupational risks for dentists and dental staffs are in competence with therapeutic advantages for patients. By far dermatitis, musculoskeletal disorder, carpal tunnel syndrome, allergies, psychological problems, respiratory problems and obesity have been known as occupational hazards of dentistry. In carrying out their professional work, dentists are exposed to a number of occupational hazards which are intensify with years. In many cases they result in diseases and disease complexes, some of which are regarded as occupational illnesses. Close contact with the patients, with their saliva and blood, exposes the dentist to occupational biohazards, mainly of the contagious kind. Strained posture at work destabilizes the osteoarticular system and causes overburdening of the spine. The overburdening also affects certain groups of muscles and joints. This brings about diseases of the musculoskeletal system and of the peripheral nervous system. Also, the functioning of the respiratory, cardiovascular and alimentary systems is disrupted. The noise of suctions, saliva ejectors, turbines, engines, amalgamators, compressors, etc., causes impaired hearing. A limited surgical area and its artificial lighting results in eye strain, conjunctivitis, blurred vision or short sightedness (Jolanta and Szymanska, 1999).

**Infection Hazards:** In their work, dentists are exposed to contact with microorganisms harmful to health. Most often they are infectious microorganisms; allergenic and toxic ones are less common. The source of harmful factors is, in most cases, the patient, but it may also be the water used in a dental unit. There are 4 basic routes of spreading harmful microorganisms in a dental surgery:

- Blood-borne route - through the blood of an infected patient;
- Saliva-droplet route - through a droplet aerosol, emitted by an infected patient and containing particles of saliva, secretions from the gum, periodontium and teeth;
- Direct contact with a patient and contaminated equipment;
- Water-droplet route - through a water droplet aerosol emitted from a handpieces of a dental unit which may contain microorganisms present in a unit reservoir, or developing in biofilm inside a unit tubing. The greatest risk for the dentist are viruses spread through blood (hepatitis B and C viruses, HIV virus) which cause serious health and life-threatening diseases. The risk from these viruses has been the subject matter of numerous publications and to a large extent; it is identified with biological hazards in dentistry (Jolanta and Szymanska, 2005).

Risk factors spread via the saliva-borne route and through direct contact include a vast range of microorganisms, from prions through viruses and bacteria to fungi. Herpes simplex virus is among the important risk factors transmitted in this way Lewis, (2004). The best known disease factors are spread by spraying water from dental units contaminated with microorganisms. Among the infectious microorganisms, bacteria from *Legionella* species developing inside dental unit waterlines constitute the highest risk. Gram-negative rods producing allergens and endotoxin are important risk factors among the potentially allergenic and toxic microorganisms. To date, extensive research of water used in dental units, and of water aerosol, to allow a comprehensive evaluation of hazards in dentistry in this respect, has not been conducted (Atlas *et al.*, 1995).

**Physical Hazards:** Ionizing radiation from diagnostic radiography machines is the greatest source of radiation hazards in dentistry however, other noteworthy sources include UV light sources employed for curing composite materials and lasers. Intra oral and panoramic radiography widely used in dentistry is relatively safe, while cephalometry is more hazardous as the radiation level are

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higher. Exposure to ionizing radiation can be minimized if radiation protection recommendations outline below are strictly followed-

- Ensure the safety of the X- ray unit by regular professional maintenance.
- Use accurate timer
- Use sound professional judgment to limit the no. of exposures
- Use lead aprons for all patients
- Wearing a radiation monitoring device
- Keeping abreast of current radiation protections recommendations.

Ionizing radiation is a well-established risk factor for cancer. However, despite the fact that most dental offices and clinics have x-ray machines that are in frequent use, the exposure of dental workers to ionizing radiation and the associated potential cancer risk have been assessed in only a few studies. It appears that there has been a downward trend in the occupational dose of ionizing radiation received by dental workers, which provides evidence of the efficacy of radiation protection measures. Nonetheless, concerns remain about total-body radiation dose and the risk of cancer; for example, one study suggested that dentists and dental assistants were at increased risk of papillary thyroid cancer (Samaranayake and Anil, 2001).

**Lasers:** All lasers are potentially hazardous particularly because of eye damage, burns and the risk of fire or electric shocks. The effect of the laser on a target tissue depends on the wavelength, beam power, degree of focus, duration of exposure and distance to target as well as the degree of absorption by the tissue. All lasers should be used with great care and never shown into the eyes. Laser products are classified into 4 categories depending on their power output. Class I and class II are relatively safe but class III and class IV lasers are more powerful and must be used with extreme care.

**Sound hazards:** A no. of devices with varying levels of sound output are used in dentistry. However, it is reassuring to note that only the high speed air turbine is considered sound/noise hazards. Other sources such as high speed evacuator emit sound well below levels that are thought to damage hearing. The duration as well as the degree of exposure is also another potential critical factor for sound induced hearing loss (Samaranayake and Anil, 2001).

**Injury:** The dentist and the clinical staff are at risk of physical injuries during many dental procedures. Sources of physical injury can include debris from the oral cavity striking the eyes, cuts from sharp instruments, or puncture wounds from needles or other sharp instruments. Such injuries can result in the transmission of serious infectious disease to the dental worker. Needle stick injuries and cuts from sharp objects and instruments (percutaneous injuries) have been reported in 1-15% of surgical procedures mostly associated with suturing. In the United States more than 800,000 needle stick injuries occur each year despite continuing education and efforts to prevent them. Eye injuries may occur from projectiles such as bits of calculus during scaling procedures and splatters from body fluids (bacterial and viral aerosols) while using high-speed hand pieces.

Another potential source of eye injury is the intense dental curing light. Users of dental curing lights should be advised to employ protective eyewear during use (Samaranayake and Anil, 2001).

**Chemical Hazards:** The chemical environment is one of the most rapidly expanding components of the work environment because new chemicals and solutions are being introduced regularly. Many of these chemicals are among those whose health effects may not be known and may pose health problems taking years to manifest. Many biomaterials and auxiliary products used in dentistry are chemically reactive. Hazardous agents used in clinical dentistry include mercury, powdered natural rubber latex (NRL), disinfectants, and nitrous oxide (N<sub>2</sub>O). By far the most important and most dangerous of these agents is mercury. Its use in dental amalgam has the potential for continuous occupational exposure of a dental practitioner to mercurial vapor which can be absorbed via the skin and the lungs.

The active component in the mercurial vapor has a particular affinity for brain tissue. Mercury poisoning can be characterized by tumors of the face, arms, or legs and can also be associated with progressive, tremulous illegible handwriting and slurred speech. The exposure risks for mercury can be minimized by careful handling procedures. The continued use of powdered NRL gloves and disinfectants has predisposed clinical dental workers to hand dermatitis, contact dermatitis, contact urticaria, and allergic dermatitis. The most serious potential hazard associated with the continued use of powdered NRL gloves in dental practice is latex sensitization caused by exposure to aerosolized NRL protein. This can result in dermatitis on the hands. Transient irritative reactions of the eyes and airways have been observed mostly associated with exposure to volatiles from resin based materials, x-ray chemicals, and cleansers. These include procaine, soaps, eugenol, iodine, formalin, phenol, and other disinfectants. More recently, reactions to methyl methacrylate monomer and elastomeric impression materials have been described and are the focus of intensive research. Although N<sub>2</sub>O was for many years believed to have no toxicity other than that associated with its anaesthetic actions, the neurological abnormalities in healthcare workers chronically exposed to N<sub>2</sub>O have disproved this notion (Adebola *et al.*, 2004).

Dental products such as acrylics, resins and polymer materials used in restorative dentistry represent a major advance in dentistry. Although these products may act as allergens in part of the population, one should keep in mind that every technology, no matter how beneficial, can exert a negative impact on some members of the population. The reality of public health will always involve balancing maximum benefit and minimum harm to the public health and well-being (Goran and Toši, 2004).

**Ergonomics:** The dental team is at high risk of neck and back problems due to the limited work area and impaired vision associated with the oral cavity. These working restrictions frequently cause a clinician to assume stressful body positions to achieve good access and visibility inside the oral cavity. Furthermore, dental procedures are usually long and require much more concentration during work.

**Carpel Tunnel Syndrome:** The carpel tunnel is the most common site of nerve entrapment in upper limb. Carpel tunnel is a peripheral neuropathy caused by compression of median nerve as it passes through the carpel tunnel. The syndrome occurs more often in dominant hand but is frequently bilateral. The first symptom of syndrome are pain and numbness in hand, although it is difficult to avoid awkward position of wrist and hands during certain dental procedures. A number of dental doctors suffer from a defect of the median nerve and of the cubital nerve. An early syndrome of a defected median nerve shows in acroparaesthesiae. A consequence of the defected median nerve in the carpal canal is the so-called tunnel syndrome. Its early phase is dominated by paroxysmal paresthesia of the thumb and index finger, which occur almost without exception at night and which are accompanied by sensomotor disorders of the thumb and index finger as well as by the atrophy of the thenar muscles (Samaranayake and Anil, 2001).

#### To reduce the risk

- Take rest between patients
- Avoid gripping instruments too tightly
- Perform active movement of wrist and hand as warm up.

**Back pain:** Back pain is one of the most common and troublesome of complaints; its exact causes are legion and an exact diagnosis is often difficult. It has been stated that the most common sites of pain among dentists and dental auxiliaries are in the areas of the cervical and lumbar vertebrae. The shape of the vertebral column, aging changes, weak muscles, postural practice, movements, lifting techniques, and mechanical stress have been identified as factors that contribute to neck and back pain in general (Al *et al.*, 2001). Back pain syndromes diagnosed in dental workers originate from spine degeneration in its different phases. Neck discopathy results in cervical nerve pains which are particularly common among dental practitioners. The posture of the dentist at work, with the neck bent and twisted, an arm abducted, repetitive and precise movements of the hand, are a frequent cause of the neck syndrome and of pain within the shoulder and upper extremities.

#### To reduce the risk of low back pain

- Avoid prolonged posture
- Extension of lower back
- Taking frequent break
- Exercise regularly (Asuzu, 1994).

**Psychological:** Occupational diseases may result from many contributing factors, such as aggravating social and economic conditions, changes in legislation and/or labor market, implementation of new technologies and changes in the workforce, service and administrative sectors. The psychological aspects of dentist-patient cooperation are very important. In everyday clinical practice a dentist has to adopt an individual attitude towards a patient, depending on his/her mental state and personality. In most cases, the knowledge of psychology, good communication skills and establishment of a proper relation between dentist and patient are the most crucial factors deciding whether the prophylactic steps and the treatment will be successful (Peter. A. Leggat *et al.*, 2007).

Dentistry is a profession that demand incessant, exacting, high level performance. In addition, dentist have staff super visionary responsibilities, economic pressure, a need to relate to their colleagues and very importantly, to the needs of their patient. In a survey related to the later aspect it was found that the patient experiencing pain, or moving in the chair, and waiting for a late patient were the most stressful aspects encountered. Thus the anxious and the uncooperative patients appear to make the dentist's life more stressful. Factors such as falling behind schedule, striving for technical perfection, and causing discomfort to patients are considered to be other stressful aspects of dental practice.

As this review shown many health related problems are present with modern dentistry but accidents and diseases in the workplace have generally been seen as part and parcel of everyday life, bad luck, carelessness and no one's fault, particularly not the owners of the work place when a worker is affected. Prevention of hazardous conditions in the workplace is central to the practice of occupational health as a profession. Occupational health and dental waste management can and should be considered an integral part of the broader delivery of public health services.

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