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The Relationship Between Occupational Hazards and Oral Health in Different Professions

Nawaf Mohammed Almustafa[1], Ahad Nasser Albulayhid[2], Aidel Abdullah Alshahrani[3], Soha Hassan Albeirouti[4], Mohammed Nasser Aldosari[5], Muneera Mohammed Alsaud[6], Khalid Waleed Albawardi[7], Tawfeeg Saleh Aloriny[8]

Abstract

It is well known that occupational hazards impact general health but little is known about how they affect oral health. Risks associated with various occupations include chemical exposure, ergonomic strain, stress-induced bruxism and dietary practices that affect oral health. Heavy metals and industrial chemicals such as lead, sulfuric acid and mercury can cause mucosal lesions, systemic toxicity and dental erosion. Bruxism, TMJ disorders, and dry mouth are more common in high-stress occupations like law enforcement and healthcare, which can result in gum disease and enamel wear. The risks of xerostomia and disturbed oral hygiene habits are increased for shift workers and people exposed to high temperatures, which exacerbates oral health problems. Additionally, exposure to pesticides in agriculture is associated with a higher risk of oral cancer and burning mouth syndrome while airborne pollutants like silica dust and welding fumes increase vulnerability to oral infections and precancerous lesions. First responders and healthcare professionals are also more vulnerable to infectious disease transmission that compromises oral health. The relationship between oral health and occupational hazards in various professions is examined in this literature review, which also identifies important risk factors, their effects and possible preventive measures. For workers in a variety of industries to have better oral and general health outcomes, these risks must be addressed.

Keywords: *Occupational Hazards, Chemical Exposure, Ergonomic Strain, Oral Health.*

Introduction

Although oral health is essential to overall well-being, it is not given much attention when it comes to controlling occupational health hazards at work. The majority of professionals face occupational hazards that have a significant impact on their oral health (1, 2). Although general workplace health and safety have been the subject of a great deal of research, little is known about the precise effects of occupational hazards on oral health.

Exposure to chemicals in industrial settings such as acids, heavy metals, and toxic fumes, can cause systemic toxicity that affects oral tissues, dental erosion, and discoloration. Employees of

[1] Department of Orthodontics, Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia, Email: nawaf.mmd@hotmail.com, (Corresponding Author)
[2] Department of Dentistry, King Abdulaziz Medical Center Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia.

[3] Department of General Directorate of Medical Services, Presidency of State Security, Riyadh, Saudi Arabia
[4] Department of Dentistry, King Abdulaziz Medical City, Ministry of National Guard, Jeddah, Saudi Arabia
[5] Department of Orthodontics, Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia
[6] Department of Dentistry, Ministry of National Guard - Health Affairs., Riyadh., Saudi Arabia
[7] Department of Orthodontics, Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia
[8] Department of General Directorate of Medical Services, Presidency of State Security, Riyadh, Saudi Arabia

battery plants exposed to sulfuric acid fumes, for example, frequently suffer from accelerated enamel erosion, and dentists who work with amalgams made of mercury may be at risk for heavy metal toxicity. In addition to chemical risks, miners, athletes, and construction workers frequently face mechanical risks like traumatic injuries and ergonomic strain. While athletes, particularly those participating in contact sports, commonly sustain dental injuries, construction workers are more likely to sustain facial trauma from falling objects or accidents involving machinery. Temporomandibular joint (TMJ) disorders can also be caused by repetitive strain injuries and poor posture among laboratory technicians, dentists and surgeons (3, 4). These conditions can result in chronic pain and difficulty speaking and chewing. Ocular disease is more common in some occupations because of particular occupational factors, such as those in the medical field, manufacturing, and night shift work (5, 6).

Psychosocial factors like work-related stress and irregular schedules can have a significant impact on oral health in addition to physical risks. Bruxism (teeth grinding), temporomandibular disorders and xerostomia (dry mouth) are more common in high-stress occupations like healthcare, law enforcement, and corporate settings. Stress-related circumstances may cause an imbalance in the oral microbiota, raising the risk of dental caries and periodontal disease (7, 8). Additionally, shift workers such as nurses, flight attendants, and factory workers have inconsistent eating and oral hygiene practices, which raises their risk of periodontal disease and dental caries.

Oral health is significantly impacted by dietary practices that are influenced by workplace culture. Caffeine, sugary snacks, and carbonated drinks are all common among high-pressure workers, and they all contribute to acid erosion and the development of dental caries (9, 10). Conversely, employees in physically demanding occupations like construction or agriculture might disregard their oral health because they place more importance on maintaining their energy and hydration levels than on maintaining their oral hygiene (11, 12). The accessibility of occupational dental care and preventive measures is another crucial but frequently disregarded element. Certain occupations like the military have formal dental health programs that cover preventive care and regular examinations (13)However, the lack of appropriate oral healthcare policies in many labor-intensive and industrial sectors causes a delay in the diagnosis and treatment of oral health issues. Additionally, access to dental care is impacted by socioeconomic differences among occupational groups, blue-collar workers frequently face logistical and financial obstacles to timely treatment(14, 15).

To support workplace policies and practices that aim to protect employees' well-being and to guide targeted preventive intervention, it is essential to understand the connection between occupational hazards and oral health. This review covers the range of occupational risks to oral health, their effects, and potential remedies to lessen those effects.

Methods

A comprehensive search of the literature was carried out using databases like PubMed, EBSCOhost, ProQuest, and Google Scholar. The inclusion of current and pertinent findings was ensured by reviewing studies published between 2015 and 2025. The search was conducted using the following keywords: "Stress-induced bruxism", "work-related dental diseases" 'occupational hazards and oral health", "chemical exposure and dental erosion", and "night-shift work and oral hygiene". Experiments, systematic reviews, and observational studies that looked at the connection between oral health and occupational hazards met the inclusion criteria. Excluded from consideration were studies that had no direct bearing on oral health and only

addressed general health. The types of occupational risks that were found, their effects on oral health and suggested preventive measures were the main topics of data extraction.

Discussion

Oral Health and Exposure to Chemicals

Worker exposure to dangerous chemicals in some occupations can have a direct effect on oral health (16, 17). Acidic fumes, heavy metals, and toxic compounds are commonplace for industrial workers, especially those involved in manufacturing, welding, and battery production. These substances erode enamel and are linked to periodontal disease (18, 19). Research shows that extended exposure to airborne acids like sulfuric acid in battery factories and hydrochloric acid in metal processing significantly demineralizes enamel, raising the risk of dental caries and hypersensitivity (20, 21). In particular, long-term exposure to radiation (22, 23) from imaging procedures and mercury in amalgam fillings exposes dental professionals to occupational hazards (24). Traces of these substances can build up despite precautions, which may impact the oral mucosa and raise the risk of oral lesions. The textile industry also frequently exposes its employees to chemical dyes and solvents, which can irritate soft tissues in the mouth and increase the risk of oral cancers (25, 26). Long-term exposure to toxic agents can cause changes in the oral mucosa and an increased risk of oral cancers in agricultural workers who use pesticides and fertilizers (27, 28).

Ergonomic Strain and Temporomandibular Disorders (TMDs)

Temporomandibular joint disorders or TMDs are characterized by clicking sounds, limited mouth movement, and jaw pain (29). In some occupations, poor ergonomic conditions are a contributing factor (30). The extended periods of immobility necessary for precision work put dentists, dental hygienists and surgeons at serious risk. The temporomandibular joint is compressed by repetitive strain and neck misalignment, which raises the risk of dysfunction and pain (31). Due to bad posture, which causes long-term jaw-related muscle tension, office workers who spend a lot of time in front of computers are also more likely to develop TMDs (32, 33). Research indicates that implementing ergonomic interventions like workstation modifications and appropriate posture training can considerably lessen TMD-related symptoms in these groups (34).

Oral Health Issues Related to Stress

Stress is a common occupational hazard in many different professions, it can lead to a number of oral health problems such as periodontal disease, xerostomia, and bruxism (35). High levels of stress like those encountered by law enforcement, healthcare workers, and business executives are linked to higher rates of bruxism or teeth grinding and clenching, which can result in fractures, enamel wear, and jaw pain (36, 37). Furthermore, ongoing stress impairs immune system performance, making people more vulnerable to periodontal disease (38). Another common problem is stress-induced xerostomia or dry mouth, which causes the salivary glands to function differently, producing less saliva and increasing the risk of dental caries and infections (39, 40). Effective methods for reducing these effects have been proposed, including behavioral interventions, stress management courses, and relaxation techniques.

Oral Health and Shift Work

Workers who work nights, such as factory workers, security guards, and healthcare professionals, suffer from circadian rhythm disturbances, which have a detrimental effect on oral

health (41-43). According to studies, shift workers are more likely to neglect their regular dental hygiene routines, eat more sugary and acidic foods, and have less saliva at night, which raises the risk of caries and gum disease(44-46). Additionally, shift work has been connected to higher incidences of GERD, a condition that worsens dental erosion because of repeated exposure to stomach acids(47). Shift workers can lower these risks by being encouraged to drink enough water, use products that contain fluoride, and making regular dental appointments.

The Effects of Temperature Extremes on Oral Health

Extreme temperature-exposed workers such as those in cold storage facilities, foundries and fire departments frequently face particular oral health issues (48-50). Increased susceptibility to tooth decay and oral infections results from dehydration caused by high temperatures, which also lowers saliva production and raises the risk of xerostomia. On the other hand, extended exposure to freezing temperatures can result in hypersensitivity of the teeth and a higher risk of enamel microcracks because of the frequent contraction and expansion of dental structures. Workers in colder climates are also more susceptible to oral ulcers and angular cheilitis (51), which is characterized by cracked lips from extreme dryness. Although hydration techniques and heat-resistant masks are examples of personal protective equipment (PPE) that can help reduce these risks, occupational health programs still lack adequate oral health interventions tailored to workers exposed to high temperatures (52).

The Role of Socioeconomic Status in Disparities in Oral Health at Work

Socioeconomic factors, which impact dietary practices, general health literacy, and access to preventive care, have a significant impact on the relationship between occupation and oral health(53). Because they frequently work in physically demanding and dangerous jobs, blue-collar workers are more likely to experience oral health problems because they have less access to dental care, earn less money, and work in environments that do not place a high priority on oral health education(54-56). Conversely, despite dealing with stress-related oral disorders like bruxism, white-collar workers typically have easier access to dental insurance and preventative care. Furthermore, there are even more obstacles for migrant workers and those working in the informal economy, such as language barriers, a lack of legal protections and cultural stigmas related to oral health. Policy-driven measures are needed to address these disparities, including mobile dental clinics for underprivileged communities, employer-sponsored dental plans and incorporating oral health education into wellness initiatives at work (57).

Dietary Practices and Workplace Impact on Dental Health

Dietary practices in some occupations affect dental health. Workers in high-pressure occupations like emergency responders and finance professionals, for example, frequently eat diets heavy in sugar and caffeine, which raises their risk of dental caries (58, 59). Conversely, over time athletes and fitness professionals who take protein supplements and acidic sports drinks may see a rise in enamel erosion(60). Furthermore, a greater reliance on processed foods results from limited access to wholesome meals brought on by time constraints in demanding jobs, which deteriorates oral health. (61).

Workplace Interventions and Preventive Measures

Implementation of Protective Measures to reduce damage from hazardous materials, industries that expose workers to chemicals, industries should mandate the use of protective masks, better ventilation, and regular dental examinations (62, 63). Ergonomic training and workplace

modifications can help prevent strain-related oral health issues like TMDs by offering ergonomic evaluations and training courses to at-risk occupations like dentists and office workers (64). Programs for Stress Reduction to lessen bruxism and stress-related oral health problems, so high-stress workplaces should incorporate mindfulness training, relaxation methods, and psychological support(65). Campaigns to Raise Awareness of Oral Health, dental hygiene education should be a part of workplace health programs, giving staff members helpful tips on how to keep their teeth healthy despite work stress (66, 67). Access to Preventive Dental Care, particularly for employees in high-risk occupations, employers ought to think about providing on-site dental examinations or flexible health benefits that cover regular dental visits (68, 69).

Conclusion

Oral health outcomes in a variety of professions are significantly influenced by occupational hazards. Exposure to chemicals, ergonomic strain, stress at work, and dietary practices all raise the risk of dental conditions like periodontal disease, enamel erosion and TMDs. Adopting successful preventive measures in the workplace requires an understanding of these risks. By addressing these workplace risks with ergonomic interventions, stress management programs, protective gear, and oral health education, employees' oral health and general well-being can be greatly enhanced. The long-term efficacy of workplace interventions in lowering occupationally induced oral health issues should be the main focus of future research. Employers and legislators can help improve the health of workers in a variety of professions by giving oral health top priority in workplace wellness programs.

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