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Risk factors for the development of temporomandibular disorders related to the work environment — a literature review and own experience

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Abstract: This article characterizes the etiology of temporomandibular disorder with particular emphasis on emotional factors that have a major impact on the development of these dysfunctions and the most common their symptoms. They mainly affect people in the third and fourth decade of life and women predominate among this group of patients.

The article analyzes the current literature (Pub Med Database, Scopus and EMBASE) in relation to the conditions in the work environment, which often constitute important causes of emotional tensions, constant state of mental tension and susceptibility to the effects of stressors, which have an impact on the state of functioning of the musculoskeletal system of the masticatory system.

Despite the high frequency of temporomandibular disorders, unfortunately only a few studies describe the influence of harmful factors related to the work environment, and own experience (information from the patient's interview) and data from the literature indicate a significant share of these factors in the development of temporomandibular disorder. The relationships and anatomical connections affecting the influence of stressors on the functioning of masticatory muscles and temporomandibular joints are also discussed. In conclusion, it should be stated that the work environment and the emotional tensions generated in it constitute a serious sociological problem and increase the risk of developing and intensify the symptoms of TMD.

Keywords: temporomandibular disorders, TMD, work environment, pain of the temporomandibular joints, stress, emotional tension.

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Introduction

Temporomandibular disorders (TMD) are a complex of varied changes, including malfunctioning of the masticatory muscles, temporomandibular joints and surrounding structures in the stomatognathic system [1–3]. Unfortunately, the number of patients with the pain form of TMD is systematically increasing and, additionally, the age of patients is decreasing. The main etiological factors are: chronic stress, depression, anxiety states, patients' neuroticism, and long-term emotional tension and inability to cope with stress. Moreover, among the etiological factors, one can also distinguish a significant sensitivity to stressors related to personal life and work environment, as well as micro and macro injuries related to the oral cavity [2–4]. Discharging the patient's excessive emotions is directly related to frequently occurring occlusal parafunctions (grinding, teeth clenching). Many symptoms of dysfunction may be the result of overloading the structures of the masticatory organ. Mainly TMD develop in the third and fourth decade of life, additionally, significantly more in women [2, 5, 6].

The main symptoms of TMD are pain and tenderness in the masticatory muscles and/or temporomandibular joints, limitation of mandibular movements and lack of their symmetry, in particular limitation of jaw opening, acoustic symptoms in the form of popping and clicking crackles, occurring during mandibular movements, tension headaches and shoulder girdle, sometimes accompanied by laryngological symptoms in the form of tinnitus, dizziness or sudden hearing impairment [1, 2, 5, 7, 8].

The above emotional disorders contribute to the occurrence of occlusal parafunctions, i.e. pathological movement habits, that are not be associated with physiological functions. These are: grinding teeth, clenching and biting the cheek mucosa or on various objects (pencils, pens, pins, objects used in professional work) [2, 5].

Such a prolonged state of increased tension in the masticatory muscles is significantly related to the occurrence of pain in the masticatory muscles and excessive load in the temporomandibular joints, which is clearly demonstrated in the results of MRI and USG examinations. The results of these studies in the form of: subchondral degenerative changes and pathological sclerotic changes or exacerbations and uneven articular surfaces, as well as morphological damage to the posterior disc ligament indicate a long-term occurrence of significant overloads within the joints, exceeding physiological conditions and the development of degenerative changes [2, 5, 8, 9].

Emotional disorders are often diagnosed on the basis of the characteristic symptoms reported by patients during medical examination. Depression is primarily symptoms such as; a feeling of indifference, depressed mood, lasting a minimum of two weeks, trouble sleeping (falling asleep, waking up early), increased irritability, lack of

self-esteem, or a decrease in the efficiency of logical thinking or a sense of indifference to the surrounding world or the persistent feeling of fatigue [5, 9–14].

The work environment is closely related to the influence of etiological factors on an emotional basis. Identifying the sources of risk at work is a very important element in the development of companies. Long-term state of tension, chronic stress, noise occurring in larger rooms (noises of printers, copiers, computer operation), often exceeding 130 dB, where many people work — contribute to the development of constant voltage. The effects of exposure to high-intensity sounds include not only subsequent hearing problems, but also nervous system irritation and severe fatigue. Moreover, our patients are often employees of corporations or companies that require a very high personal commitment, work not only at fixed hours, business trips on days off, which results in less rest and prolonged, unfavorable body position at the computer or with a telephone handset [15–18].

Despite the high frequency of TMD occurrence, unfortunately only a few studies describe the influence of harmful factors related to the work environment, and own experience (information from the interview) and literature data indicate a significant share of these factors in the development of US dysfunction [7–10].

The aim of the article was to analyze the literature in the area of the impact of harmful factors related to the work environment on the development and occurrence of TMD. For this purpose, electronic databases were analyzed: PubMed, Scopus, EMBASE. The inclusion criterion was the selection of the following entries: temporomandibular disorders — work environment, psychological factor in temporomandibular disorders — both in Polish and English (temporomandibular disorders — work environment, psychological factor in temporomandibular disorders, etiology of dysfunction of the masticatory organ).

Articles that did not address issues related to the TMD and work environment among the etiological factors and older than 2010 were excluded from the analysis. It should be emphasized that despite the significant increase in the occurrence of TMD in the world, very few articles describe this issue in connection with the work environment. Among 12 articles found in the PubMed database with the keyword — temporomandibular disorder-work environment, only 6 met the criteria for inclusion in the analysis.

On the other hand, 17 articles appeared in the Scopus database, but none of them assessed the coincidence of TMD with working conditions. In the EMBASE two articles are re-listed from the PubMed base.

Among the articles in the PubMed Shigeishi emphasizes that frequent work with visual display terminals create a threat to the development of the TMD syndrome, along with other etiological factors that have overlapping effects. In this group of assessed office workers there are symptoms of muscular and psychopathological disorders related to TMD. The author emphasizes that among the risk factors for dis-

orders in the masticatory organ are psychological aspects important for understanding the etiology of this disease [19].

On the other hand, Bragatto *et al.* [20] described the coexistence of TMD with pain and instability of the neck, which symptoms were diagnosed among computer office workers. In clinical trials, TMD were diagnosed among three groups of employees, i.e. those working with computers (with and without pain in the neck) and those not using computers at work. The results of the research showed that the majority of the assessed people with neck pain showed symptoms of TMD.

Wook *et al.* [21] conducted a study to investigate the correlation between factors related to full-time work in Korean women and the prevalence of TMD among full-time women using representative data from a national population study. The results of the above studies showed that long working hours were significantly associated with the occurrence of TMD and full-time work. These authors also emphasize that long working hours adversely affect cardiovascular disease, diabetes, depression, anxiety, and other types of mental disorders, as well as sleep patterns, cognition, and health-related behavior. In addition, temporary workers are more likely to experience mental stress and depression than regular workers.

Nishiyama *et al.* [22] assessed the factors influencing the occurrence of TMD symptoms in the Japanese working population. The research material consisted of 1969 employees of the same company. Assessing the factors of the working environment is the time using the computer, attending business meetings (stress), performing manual work and time spent in vehicles. The authors emphasized that the emotional stress associated with work plays a primary role in the development of the pain form of TMD.

An analysis of the Australian adult society in the article by Hanna *et al.* [23] showed that the disproportion between the effort related to work and remuneration in the workplace is a psychosocial risk factor for the development of TMD.

In companies, motivational competitions for employee teams are often organized, which additionally generates increased emotional stress. Overtime and work overload, inadequate remuneration, low personal culture of colleagues or ineffective management of the company as well as conflicting demands are the causes of chronic stress, which have such a negative impact on the functioning of the musculoskeletal system of the masticatory system. The problem of employee mobbing has been gaining momentum in recent times. Chronic stress, in turn, interferes with effective work and the fulfillment of assigned duties, which in turn is another new cause of emotional tension. The progressive digitization and robotization of production processes and their management is a significant challenge for older workers, whose education is not always sufficient to be fluent and master new devices [5, 15, 18].

Cardiovascular and musculoskeletal disorders are also a result of long-term stress. The principles of occupational health and safety are very important for the employee

and constitute a tool that protects against the dangers of performing professional activities. These rules are individually defined for each field of professional work [15].

The authors of the systematic review [24], assessing the relationship between stress related to the work environment, describing various instruments for assessing stress and anxiety used in the literature, concluded that few articles accurately illustrate the above relationships. They emphasized that there is a wide variety of methods used to assess TMD symptoms and assess stress, which is not conducive to the verification of the homogeneity of test results, but specific diagnosis like painless TMD, TMD symptoms, myofascial pain and TMD pain can be considered as an unequivocal group associated with TMD.

The chronic influence of stressors through the limbic system and the gamma feedback loop adversely affects the tension in the masticatory muscles, which promotes the development of occlusal parafunction in workers and is the cause of the continuous increase in tension in this group of muscles. Systematically increasing muscle tension is responsible for an unfavorable increase in occlusal forces, significantly exceeding the physiological values, and this in turn is the cause of excessive load on soft tissue structures within the temporomandibular joints [1, 2, 7, 8, 24–29]. Chronic emotional tension related to risk factors at work significantly contributes to the emergence of chronic stressors in the course of time and to constant undermining or mental tension. The role of dentists is to educate patients about the harmfulness of stress inducing factors and to indicate the need for training in coping with stress [19–22].

In conclusion, it should be stated that the work environment and the emotional tensions generated in it constitute a serious sociological problem and increase the risk of developing and intensify the symptoms of TMD. The employer should take into account the conditions offered by the company or other institutions in order to, first of all, prevent the development of significant emotional tension and frequent stressful situations and their impact on the health of mental well-being.

Conflict of interest

The authors declare that there is not any potential conflict of interest with any person and any institution.

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