

Widziewicz Kalina, Gębska Magdalena. The level of stress intensity and the incidence of bruxism in people in managerial positions in the construction industry. *Journal of Education, Health and Sport*. 2020;10(5):89-101. eISSN 2391-8306. DOI <http://dx.doi.org/10.12775/JEHS.2020.10.05.008> <https://apcz.umk.pl/czasopisma/index.php/JEHS/article/view/JEHS.2020.10.05.008> <https://zenodo.org/record/3825974>

The journal has had 5 points in Ministry of Science and Higher Education parametric evaluation. § 8. 2) and § 12. 1. 2) 22.02.2019.

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Received: 24.04.2020. Revised: 30.04.2020. Accepted: 14.05.2020.

The level of stress intensity and the incidence of bruxism in people in managerial positions in the construction industry

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SUMMARY

Introduction: Current research results show that the phenomenon of stress occurring during the performance of official tasks is becoming more and more common among the vast majority of professional groups. People holding managerial positions are subject to strong pressure because they are responsible for supervising and commissioning tasks to subordinates, and thus for the proper functioning and economic performance of the company. With this mode of work, people in managerial positions are constantly subjected to stressful situations.

Aim: The aim of the study was to assess stress and its impact on the appearance of bruxism among people in managerial positions in the construction industry. Additionally, the impact of stress on the occurrence of temporomandibular joint pain was assessed.

Materials and methods: The material were employees (n = 104) performing managerial functions in the construction industry, who gave informed consent to participate in completing the three-part anonymous research questionnaire. The first part of the survey included general information about the respondents (i.e. age, sex, education, seniority). The second part of the questionnaire consisted of seven closed questions about their professional work and stress at work. The third part of the survey consists of 8 closed questions in the form of a ten-point scale assessing the occurrence of bruxism symptoms. The obtained test results were subjected to statistical analysis, where the correlation coefficient and Pearson test ($p \leq 0.05$) were used.

Results: Stress at work was found in all respondents. 70% of respondents declare that they are satisfied with their work, and 66% say that work affects their health. Analyzing the level of stress at work (scale 0-10), the most common answer was 6 (30.77%), followed by 8 (25%). Among the factors causing stress to the most frequently chosen the answers were: time pressure (60.58%), subordinates (50%). Bruxism symptoms, i.e. headache (89%), teeth clenching (83%), temporomandibular joint pain (75%), masticatory pain (64%), worn tooth surfaces (61%) have been observed in the construction industry. . The rarest symptoms of bruxism in the examined group are: teeth grinding (59%), facial swelling (58%), sensory disturbances (54%). When asked about the level of severity of complaints reported (on a scale of 0-10) within the US, headaches followed by teeth clenching and temporomandibular joint aches. The stress felt by the respondents related to the occurrence of pain within the temporomandibular joints shows a positive correlation [$r = 0.032$]. We can therefore assume that the higher the stress level, the higher the sensation of temporomandibular joint pain. Ailments such as headaches - [$r = 0.091$] teeth clenching - [$r = 0.141$], teeth grinding - [$r = 0.116$], worn surfaces - [$r = 0.107$] and facial edema - [$r = 0.067$] also show positive correlation, but for a given significance the correlations are weak.

Conclusions:

1. People in managerial positions in the construction sector experience work-related stress.
2. Stress may affect the occurrence of bruxism symptoms in persons in managerial positions in the construction sector.
3. Higher levels of stress in the workplace may affect the higher sensation of temporomandibular joint pain.

Key words: stress, work, bruxism, temporomandibular joints, pain

Introduction

Along with the progress of civilization, people are exposed to more and more factors that adversely affect the functioning of the body. One of them is stress, which has become an inseparable element of our everyday life [1,2]. Stress in active professional groups is one of the biggest problems in the work environment, which contributes to the reduction of employee efficiency and effectiveness, increases susceptibility to psychosomatic diseases, absenteeism and can lead to physical and mental exhaustion [3,4,5,].

In 1926, Hans Hugon Selye introduced the concept of stress to health sciences. In medical terminology, it means a disorder of the homeostasis of the body caused by physical or psychological elements [6]. It can be caused by mental, physiological, anatomical or physical

factors. Stressful situations lead to increased muscle tension, which are the body's natural response to the threat [7]. Muscles of the stomatognathic system (SS), like other skeletal muscles in the human body, can overload them and react with increased tension, pain or hypertrophy [8].

Increasing psychoemotional tension leads to the emergence or intensification of already existing SS para-functions. Appearing and intensifying parafunctions contribute to the formation of micro-injuries, which over time can add up to greater macro-injuries of SS muscles with associated pain. Parafunctions, especially in chronic stressful situations, lead to increased resting muscle tone and loss of the ability to control muscle tone freely, followed by symptoms of SS disorders [8].

Bruxism is a dysfunction involving the repetitive activity of the jaw muscles, manifested in uncontrolled and often unconscious habitual grinding or clenching of teeth. It is often accompanied by such symptoms as: temporomandibular joint pain, headache, toothache and others. Two types of bruxism can be distinguished: symptoms during sleep (BS) and bruxism during wakefulness (BC) [9,10,11,12,13]. More often, patients notice bruxism that occurs during sleep. Bruxism, which manifests itself during the day, is characterized by stiffening of the jaw and repeated and prolonged contact between the teeth. Bruxism during sleep is defined as the non-rhythmic, tonic activity of chewing muscles, it can also occur as a phase, rhythmic work of these muscles [23,28]. In people with bruxism, changes can be observed in the incisal edges and chewing surfaces of the teeth, which manifest themselves in excessive wear, which causes crown wear and the appearance of visible unevenness on the tooth surface, in the worst case, serious damage can occur, e.g. fractures tooth [26]. It is estimated that this condition affects 8-31% of the population [14,15]. Discomfort associated with bruxism decreases with age. It is estimated that teenagers have 12%, among middle-aged people it is about 8%, while in older people it is only 3%. The conducted research shows that night bruxism and development remained in $\frac{2}{3}$ people who had discomfort in childhood [9]. Bruxism is a parafunction of a very complex etiology, therefore the most important element in the early diagnosis of the disorder is the early assessment of the patient's symptoms. The main symptoms that force the patient to consult a doctor are in the first place: temporomandibular joint pain, headache, worn tooth surfaces, craniofacial pain, etc. Long-lasting pain may have serious dental consequences, and pain may also cause structural disorders within the structures of the stomatognathic system [9,15].

The available Polish and international literature does not contain any studies on the assessment of the occurrence of bruxism symptoms in employees of the construction industry. Scientific research indicates that people exposed to increased stress in the workplace are more likely to have SS para-functions, especially bruxism. Undoubtedly, it can be said that the construction industry is one of the professions in which there are numerous stressors. According to research from the Central Statistical Office, in 2016 the construction industry was in the top ten most dangerous occupations in Poland. The above fact prompted the authors to become interested in the topic of assessing the occurrence of stress and symptoms of bruxism in employees of the construction industry.

Aim

The aim of the study was to assess the occurrence of stress and its impact on the appearance of bruxism symptoms among persons holding managerial positions in the construction industry. Additionally, the impact of stress on the occurrence of temporomandibular joint pain was assessed.

Materials and methods

The material for the study were employees performing managerial functions in the construction industry, who expressed an informed consent to participate in completing the anonymous research questionnaire. The study was conducted on a group of 104 people. Respondents provided answers to questions about the nature of work, the amount of stress at work, ailments including symptoms of bruxism. The research used the diagnostic survey method, based on a survey technique using the author's questionnaire, which consisted of 20 questions. The first part of the survey included general information about the subjects. The questions concerned: age, sex, education, seniority. The second part of the questionnaire consisted of seven closed questions about work, duties at work, job satisfaction, the impact of work on health, the level of stress felt and stressors in the workplace. The third part of the survey consists of 8 closed questions in the form of a ten-point scale assessing the occurrence of symptoms of bruxism, i.e. temporomandibular joint pain, masticatory pain, headache, clenching of teeth, gnashing of teeth, worn surfaces, facial sensations, facial swelling. This structure of the survey allowed to obtain an answer to the hypothesis and to solve research problems. The obtained test results were subjected to statistical analysis, where the correlation coefficient and Pearson test ($p \leq 0.05$) were used.

Results

104 people took part in the study, of which 61% were men and 39% women. The largest group of respondents were people aged 21-30, of which 59% were men and 41% were in this group. The second group consists of people aged 31 to 40 - 22% of respondents. The smallest group were people between 51 and 60 years old - 3%. 57% of respondents with engineering education, the second most numerous group were people with 32% master's education. The smallest number of respondents were people who answered "none of the above" to the question about education, 11% of them. Among the people surveyed, the largest number were people in the position of construction engineer - 46%. The second most numerous group were people in the position of construction manager - 30%. The last group was made up of people in other positions, including designers, inspectors and apprentices - 24%. In terms of seniority, the largest group were people working in a given workplace for up to 2 years - 43%. The second most numerous group are people with seniority from 2 to 5 years - 29%, the third group were employees with seniority from 5 to 10 years - 17%, and the least numerous group were people with seniority over 10 years - 11%. When asked about the type of work performed, the most answers were obtained with the so-called mixed work, i.e. a combination of mental and physical - 51%, the second most common answer was mental work - 47%, people working physically are only 2% of respondents. The average working time among the respondents was 10 hours. Below is an analysis of the responses received from the second part of the survey on job satisfaction (fig. 1) and its impact on health (fig. 2).

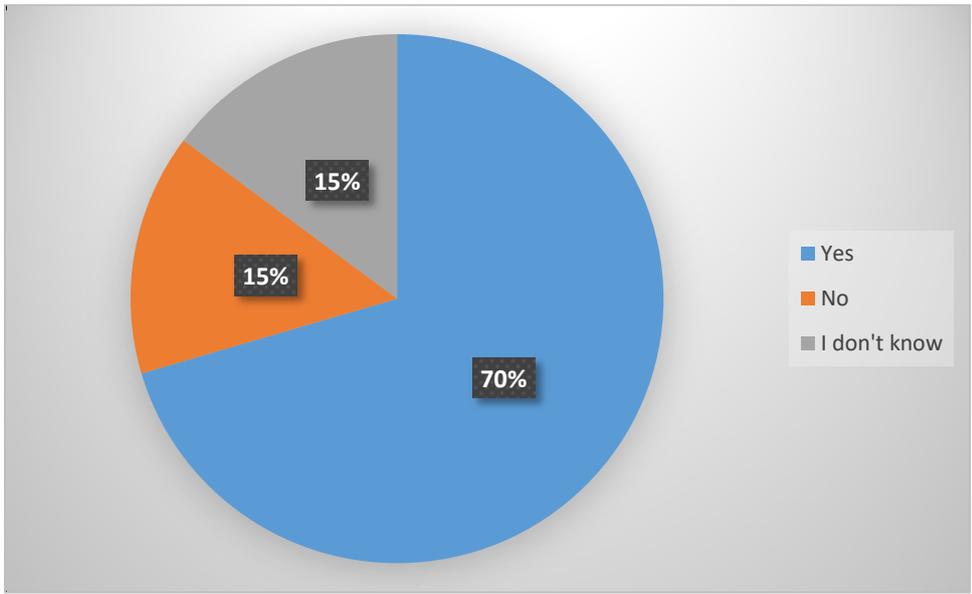


Fig. 1. Percentage analysis of the answer to the question: Are you satisfied with your work?
Source: own research

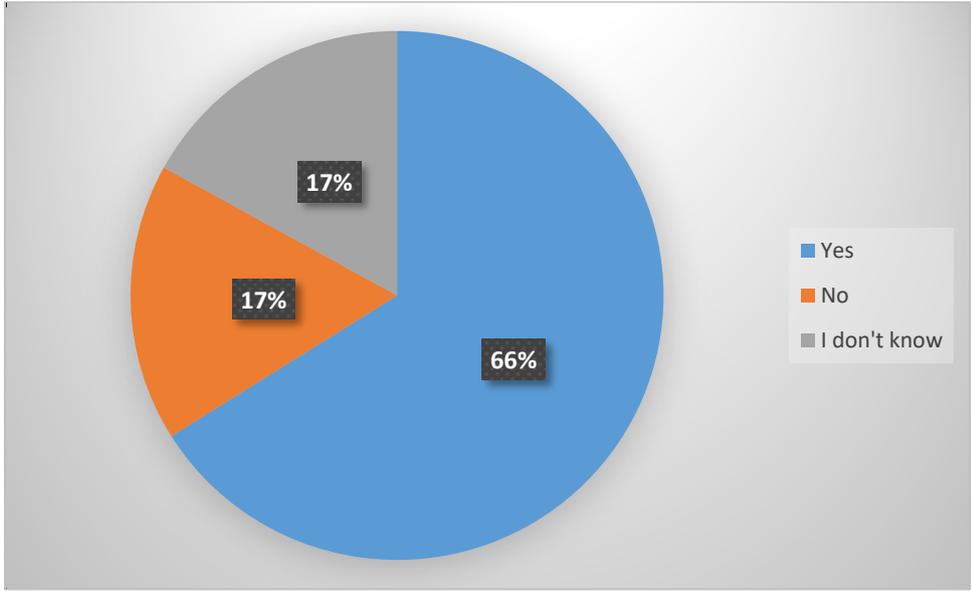


Fig. 2. Percentage analysis of the answer to the question: Does your work affect your health?
Source: own research

As it results from fig. 1 to the question "Are you satisfied with your work?" There were people who answered this question with an affirmative - 70%. Negative answer to the question was given by 15% of respondents, the same number of people marked "I don't know".

When asked about the impact of work on health, 66% of respondents indicated that work affects their health, 17% answered that work had no effect on their health, and 17% were unable to answer the question (fig. 2).

To the question Is your work stressful, all respondents answered in the affirmative (100%).

Below is presented the level of stress intensity (on a scale of 0 to 10) of employees in the construction industry (fig. 3).

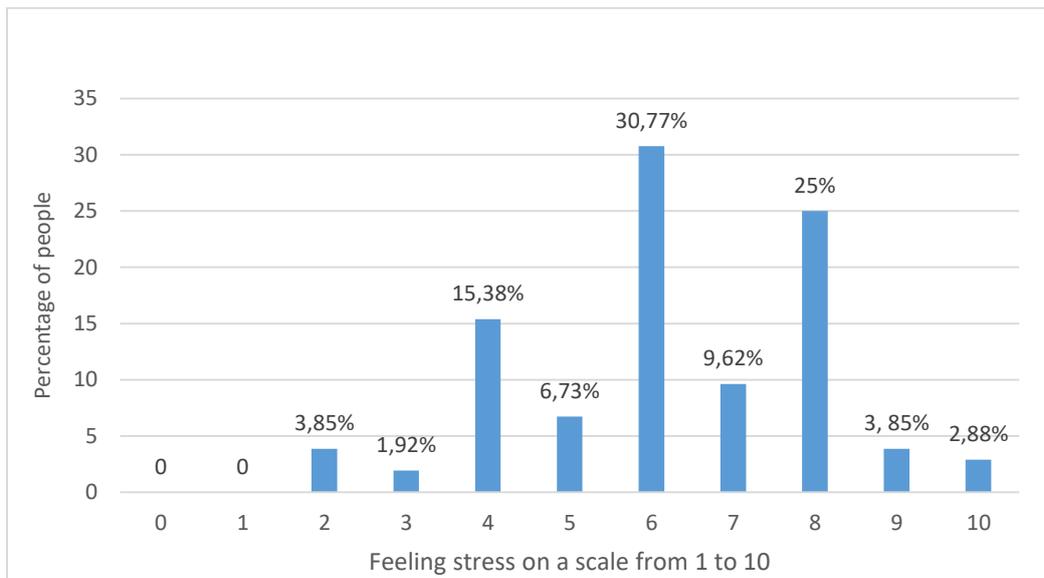


Fig. 3. Assessment of stress intensity in employees on a scale of 0 to 10.

Source: own research

Analyzing the answers regarding the assessment of stress intensity (on a scale of 0 to 10, where 0 is the least stress and 10 the highest) in the workplace (fig. 3), it appears that the most common answer was answer 6, it was marked by 30.77% of respondents. The second most common answer was answer 8, which is how 25% responded. The third in terms of the most numerous answers was answer 4, this was the answer given by 15.38% of respondents. Nobody pointed out stress at levels 1 and 0.

Another question concerned the factors that cause stress related to work (fig. 4).

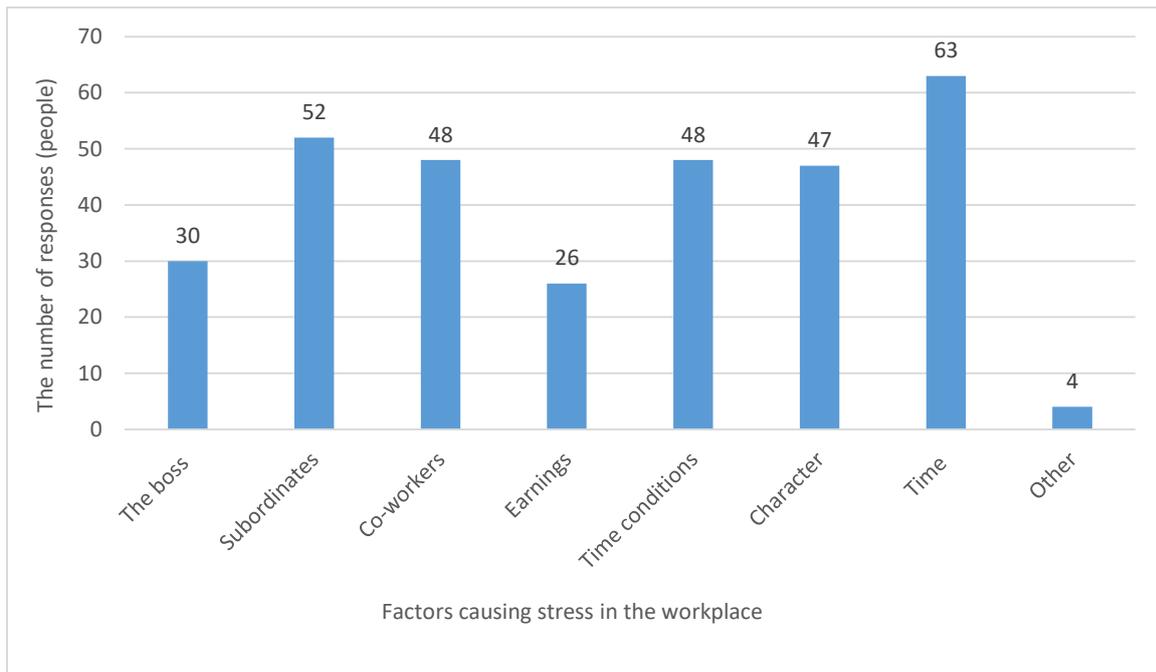


Fig. 4 Factors causing stress in the workplace.

The factor that was most often chosen as the source of stress was the working time, as many as 63 respondents chose it, the second most frequently chosen were subordinates - 52 people. In third place were two co-workers and time conditions ex aequo, and 48 people marked them.

The analysis of responses obtained from the third part of the survey on the occurrence of bruxism symptoms within the SS is presented below.

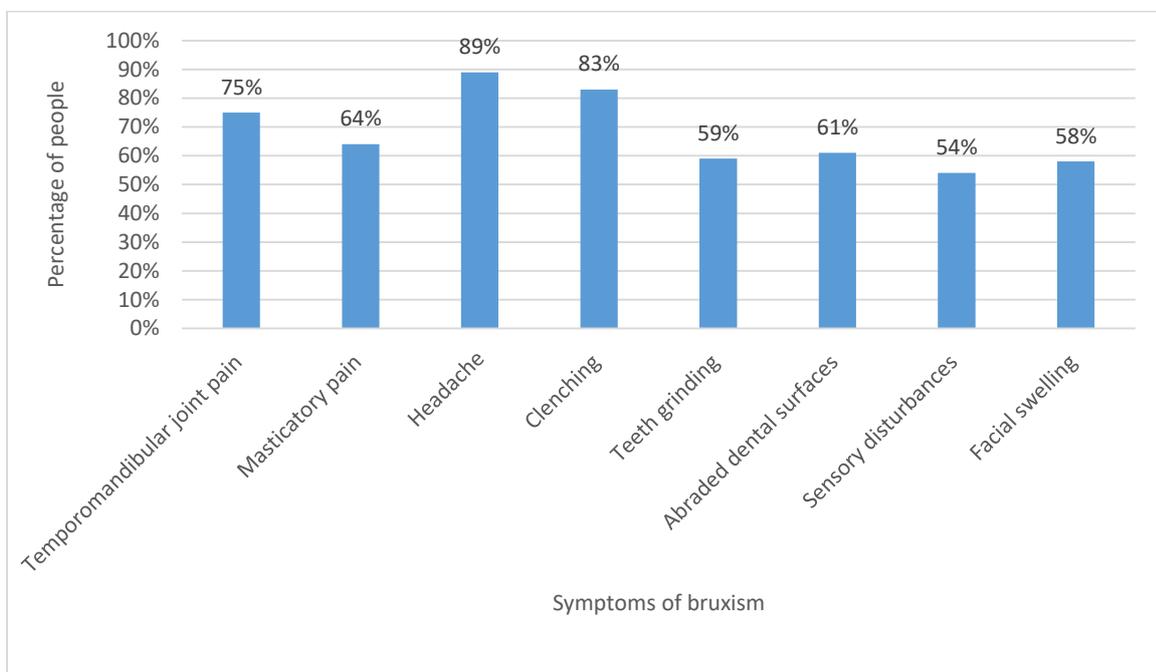


Fig. 5 Incidence of bruxism symptoms in employees in the construction industry.

As shown in fig. 5, the most common symptoms of bruxism in the study group are: headache (89%), clenching (83%), temporomandibular joint pain (75%), masticatory pain (64%),

abraded dental surfaces (61%). The rarest symptoms of bruxism in the examined group are: teeth grinding (59%), facial swelling (58%), sensory disturbances (54%).

Persons participating in the study were asked to specify, on a scale from 0 to 10 (where 0 means no pain and 10 the greatest pain), the level of bruxism symptoms intensity during stressful situations (fig. 6).

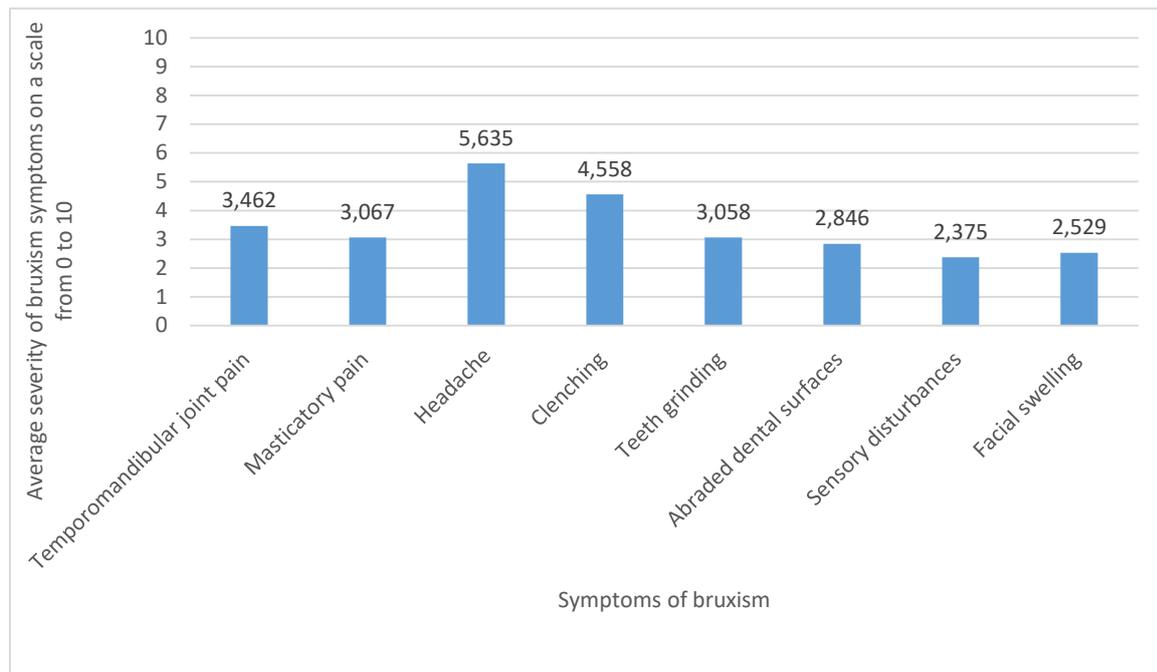


Fig. 6. Average severity of bruxism symptoms on a scale of 0 to 10.

When asked about the severity level of the ailment, the highest value on a scale of 0-10 was obtained for headaches, which on the scale received an average of 5.63. The second most frequently observed symptom was clenching of teeth and was rated on a scale of 4.55. The third was the temporomandibular joint pain, on a scale of 3.46 on average. The most rarely observed symptom was facial sensation and was rated at 2.37 on a scale of 0 to 10 on average. The highest level of stress was felt by the respondents most often after work. This answer was chosen 78 times, 8 people could not select a specific answer and chose the "I don't know" answer.

Analyzing the survey, it can be noticed that stress and related problems are more felt by women. The average stress intensity among 41 examined women was 6.34, the average stress concentration among 63 men was 6.17. Young people aged 21 to 30 experience more stress at work, the average stress intensity in this age group is 6.46. The least stressful group are people aged 41-50, among them the average stress intensity is 5.5. In terms of seniority and education, people with work experience from 2 to 5 years are the most exposed to stress, average stress intensity is equal to 6.83 and with engineering education 6.61. People working in the profession over 10 years have the least stress, where the average stress intensity is 5.09 and people with managerial education, where the average stress intensity is 5.88. Workers performing mixed work are more exposed to stress, the average stress intensity among these people is 6.32. The group that least feels stress are people who perform physical work, where the average stress intensity is 6. The stress felt by the respondents related to the occurrence of

pain within the temporomandibular joints shows a positive correlation [$r = 0.032$]. We can therefore assume that the higher the stress level, the higher the sensation of temporomandibular joint pain. However, the obtained correlation with the assumed significance of $p < 0.500$ is a weak correlation (fig. 6.)

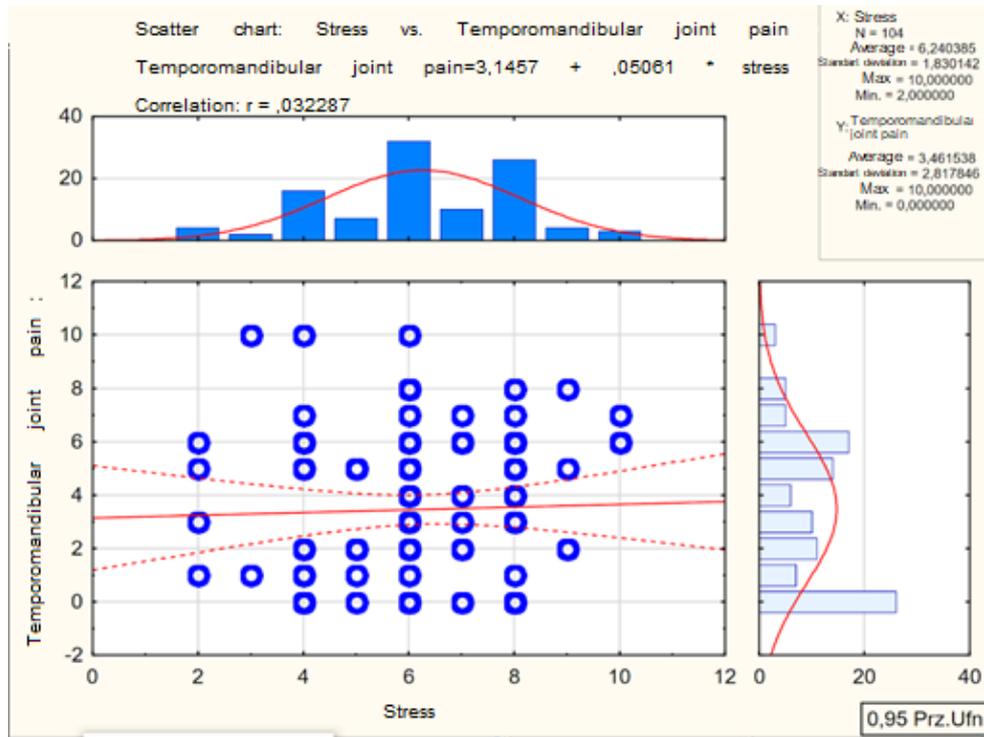


Fig. 6 Correlation between the occurrence of stress and temporomandibular joint pain. Ailments such as headaches - [$r = 0.091$] teeth clenching - [$r = 0.141$], teeth grinding - [$r = 0.116$], worn surfaces - [$r = 0.107$] and facial edema - [$r = 0.067$] also show positive correlation, but for a given significance the correlations are weak (table 1).

Table 1. Correlations between the occurrence of stress and the appearance of symptoms of bruxism.

Variable	Stress correlations and symptoms. Assumed significance [p <0.500]	
	Average	Stress
Stress	6,240	1,000
Pain in the temporomandibular joints	3,462	0,032
Chewing muscle pain	3,067	-0,003
Headaches	5,635	0,091
Teeth clenching	4,558	0,141
Teeth grinding	3,057	0,116
Wear tooth surfaces	2,846	0,107
Sensations in the face	2,375	-0,012
Swelling of the face	2,529	0,067

Discussion

Scientific research indicates a proportional relationship between the occurrence of bruxism and an increase in civilization progress. Along with progress, the number of factors affecting the human body increases [1]. Already in the past era it has been observed that there are changes in the SS due to psychoemotional dysfunctions [16,17]. Research aimed at showing the relationship between bruxism and stress brings divergent results, due to the use of different stress tests and different research groups. Research conducted by Baron in a group of 150 learners aged 17-20 showed that bruxism is more common in people with increased emotional tension. Raymond B. Catella's self-recognition sheet was used for this analysis, they diagnosed bruxism using an indicator developed by Panek [18]. There are also scholars who think that bruxism occurs in people with certain characteristic personality traits, such as: excessive activity, the need to control the situation, aggression [19]. O'Toole and Kampe in their research have shown that people with bruxism are cautious, shy, have a problem with expressing feelings. Kampe, on the other hand, used the personality scale, where he observed that people with bruxism were much more susceptible to stress [21]. Rossi and Manfredini have observed that the level of stress resulting from socio-economic conditions has no effect on the development of bruxism [20].

Stress and dealing with it is one of the most important problems in modern psychology. Chronic stress is assigned an important role in the formation of mental discomfort, which can lead to physiological changes in the body. People are most often exposed to the effects of stressors at work. In the light of the research results presented above, stress resulting from non-standard working hours, hard cooperation with subordinates and colleagues can be considered important factors affecting employees' health. Based on the analyzed cross-sectional studies, it is difficult to interpret the results obtained in cause and effect categories [19,21]. Using the report from the conducted Occupational Stress Questionnaire during a project co-financed by the European Union under the European Social

Fund "Know your rights at work - competence support for OPZZ activists and employees", it can be seen that people constantly exposed to high levels of stress experience dysfunctions in the psychological and physiological area, which may result in deterioration of the employee's health. 40% of employees in managerial positions experience severe stress, and 34% of employees experience medium-level stress. Summarizing this report and comparing with the conducted research, it can be observed that persons performing managerial functions are to a large extent exposed to stress [22,23].

According to research conducted by the authors, employees of the construction industry are exposed to stress during work (100% of respondents). The most common causes of increased stress included time pressure (60.58%) and supervision of subordinates' work (50%). Employees had symptoms of bruxism, in particular headaches, temporomandibular joints and teeth clenching. The results obtained show a small relationship between the intensity of the level of stress present and the perceptible complaints of the SS. This is due to too few tests and too much discrepancy in the scoring of the scales. (1-10 instead, e.g. 1-5). The correlation maintains a positive result, which suggests that as the stress increases, the ailments increase but this correlation is negligible.

Due to the complex etiology of bruxism and the lack of standardized research tools for diagnosis, it is difficult to finally determine how much stress stress has on the appearance of bruxism. Many analyzes focus on the psychosocial aspect of the problem, but some research results are not consistent. Available data makes it impossible to determine the exact effect of stress on bruxism.

Due to the complex etiology of bruxism and the lack of standardized research tools for diagnosis, it is difficult to finally determine how much stress has influence on the appearance of bruxism. Many analyzes focus on the psychosocial aspect of the problem, but some research results are not consistent. Available data makes it impossible to determine the exact effect of stress on bruxism.

The results obtained by the authors lead to the continuation of research on a larger number of people including standardized measuring tools.

Conclusions

1. People in managerial positions in the construction sector experience work-related stress.
2. Stress may affect the occurrence of bruxism symptoms in persons in managerial positions in the construction sector.
3. Higher levels of stress in the workplace may affect the higher sensation of temporomandibular joint pain.

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