

ASSOCIATION OF STRESS AND SYMPTOMS OF TEMPOROMANDIBULAR DISORDERS IN STUDENTS

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ABSTRACT

Objective: Investigate the prevalence of symptoms of temporomandibular disorders (TMD) and their association with perceived stress among students.

Material and Methods: The sample included 139 students of the third, fourth, fifth and sixth years of the Faculty of Dentistry University of Sarajevo. Students filled out two questionnaires in person and electronically which were anonymous. The Fonseca anamnestic index was used to assess the presence of TMD, and the second questionnaire is the Perceived Stress Scale (SPS) referring to the presence of existing stress and its level in the last month.

Results: The average values of the total TMD score indicate the presence of mild TMD within each group of students. A moderate level of SPS was most often present in students in the fourth year of study, while a high level of stress was most often present in students in the third year of study. ANOVA showed no differences in the average values of the TMD and SPS scores between the examined groups ($p < 0.220$; $p < 0.745$). There is a correlation between perceived stress and TMD symptoms in third ($r = 0.466$; $p < 0.004$) and sixth year students ($r = 0.418$; $p < 0.016$).

Conclusion: TMD and perceived stress were present in students at all years of study. The frequency of TMD symptoms and the level of perceived stress were different in all years of the study. Students of the third and sixth year of study who had a higher level of perceived stress also had a significantly higher prevalence of TMD.

Keywords: TMD, perceived stress, Fonseca anamnestic index

Introduction

Temporomandibular disorders (TMD) include a numerous of clinical conditions related to temporomandibular joint (TMJ), masticatory muscles and the adjacent tissue structures. These conditions are characterized by pain in temporomandibular joints and/or muscles, restricted mandible movements and sounds (clinking and crepitations) in joints during mandible function. Headache and tinnitus can also be present [1,2]. As for general population the prevalence of TMD is 31% while in children and adolescents it is 11% with a dominant presence of dislocation of discus articularis with reduction [3]. It is considered that temporomandibular disorders are the main cause of odontogenic and orofacial pain. The pain caused by TMD can be transferred to various regions such as the upper and lower jaws, the area of the ear, eye and forehead, cervical regions of the spine or the upper parts of the shoulder [4]. The TMD etiology is multifactorial where functional, structural and psycho-social factors can be a cause, either individually or in a combination. Most commonly these are direct or indirect traumas, parafunctional habits and stress. The perceived stress, anxiety, depression and sleeping disorder are risk factors in the emergence of TMD. Stress is conducive to increased muscle activity and the appearance of pain. [5,6]. Academic commitments, high educational and social standards in students can result in sleeping disorder and psychological stress that can contribute to TMD [5,7,8]. Stress affects the quality of life and it is correlated with many pathological conditions. Chronic stress affects health, immune, cardiovascular, endocrine and central nerve systems. Unless chronic stress is not treated, it can cause insomnia, high blood pressure and thus damage the mental health of an individual [9-11].

Fonesca Anamnestic Index (FAI) was developed to examine the prevalence and the estimate of seriousness of TMD, based on signs and symptoms with a high degree of diagnostic accuracy [12-14]. The Scale of Perceived Stress (SPS) is a broadly used instrument for measuring stress. SPS evaluates to what extent an individual has experienced life as unpredictable, uncontrollable and overloaded, but also to what extent the external factors have influenced an individual and his ability to deal with

them [15]. Since TMD has a multifactorial etiology and various symptoms and signs, its diagnosis and treatment are made more difficult. There is no data about the symptom prevalence of TMD nor about its correlation to stress in our student population.

Taking into account an increasing prevalence of stress in younger people as well as symptoms and signs of TMD, it becomes necessary to research their correlation in students with the aim of prevention and appropriate therapy [16-19]. The aim of this research was to examine the prevalence of TMD symptoms and their correlation with perceived stress in students of the Faculty of Dentistry University of Sarajevo.

Subjects and methods

In this research the sample consisted of 139 students of the Faculty of Dentistry University of Sarajevo. The students were given detailed explanations about the research, the questions were clearly formulated and the students themselves gave their consent to participate. The participation in this research was voluntary. The Ethical committee of the Faculty of Dentistry University of Sarajevo issued its approval of this research under no: 02-3-4-19-1-10/2022. Distribution of students was as follows: 36 third-year students, 40 fourth-year students, 30 fifth-year students and 33 sixth-year students. The students received two questionnaires in person and via email to fill in anonymously. The students were asked to fill in the Fonesca Anamnestic Index (FAI) questionnaire and the questionnaire of the perceived stress (PSS).

Fonesca Anamnestic Index consists of 10 questions with three possible answers: "yes" (10 points), "sometimes" (5 points) and "no" (0 points). By adding all points, it is possible to classify the seriousness of TMD, the absence of symptoms and signs from 0-15 points, mild disorders from 20-45 points, moderate disorders from 50-65 points and severe disorders from 70 to 100 points [6,13,20]. The scale of perceived stress (SPS) consists of 10 questions regarding the presence of existing stress and its level in the last month. Each question is marked on the scale from 0-5 points which are graded as follows: 0-never, 1-almost never, 2-

sometimes, 3-often, 4-quite often. The points for questions 4,5, 7, 8 in this questionnaire have been changed so that they are calculated as 0=4, 1=3, 2=2, 3=1, 4=0. The final result is obtained by adding all points which can be in the range from 0-40 points. The results can be interpreted as follows: the range from 0 - 13 points - low level of stress, from 14 - 26 points - moderate level of stress and the range from 27- 40 points - highly perceived stress level [15, 21, 22]. In the course of SPS questionnaire filling in the aim was to test students about their feelings and thoughts in the past month. The students were asked how often they felt or thought in a certain way. In general, they were supposed to give the best possible answer in that specific situation.

Statistical methods of data analysis

Statistic data analyses were implemented in IBM SPSS Statistics v.22 software. With regard to descriptive statistic parameters arithmetic mean, standard deviations and min-max value range on quantitative variables were calculated followed by absolute and relative prevalence on nominal variables. As for parametric statistical methods One Way ANOVA was used for comparison of independent groups, while for the research of correlation between variables Pearson's Linear Correlation was applied. Research hypotheses were tested at alfa level of reliability from 95%.

Results

In this research the total of 139 subjects from different years of studies was included. The distribution of subjects according to the year of studies was presented in Table 1. The fourth-year students had the highest mean value of score for the presence of symptoms and signs of TMD, namely $29,8 \pm 19,8$ (Mean \pm SD), while the third-year students had the lowest value of score, i.e. $20,7 \pm 16,1$ (Table 2.). The highest mean score value of perceived stress was shown by third-year students ($18,6 \pm 5,9$) and fourth-year students ($18,1 \pm 4,7$), while the lowest level of stress was shown by the subjects from the fifth year of studies ($17,5 \pm 3,6$) and the sixth year ($17,4 \pm 5,5$),

Year of studies	n	%
3 rd year	36	25,9
4 th year	40	28,8
5 th year	30	21,6
6 th year	33	23,7
Total	139	100

Table 1

Number of subjects according to year of studies

Year of studies	Total score - TMD			
	Mean	Standard Deviation	Minimum	Maximum
3 rd year	20,7	16,1	0	70
4 th year	29,8	19,8	0	80
5 th year	24,5	17,5	0	70
6 th year	27,0	22,8	0	95

Table 2

Mean values, variables and value range of total TMD score

Year of studies	Total score - Scale of perceived stress SPS			
	Mean	Standard Deviation	Minimum	Maximum
3 rd year	18,6	5,9	8	30
4 th year	18,1	4,7	6	26
5 th year	17,5	3,6	0	24
6 th year	17,4	5,5	0	31

Table 3

Mean values, variables and value range of total SPS score

which is shown in Table 3. The prevalence of TMD level related to the year of studies was presented in Graph 1. Mild disorders were most commonly shown by subjects from the third year (30%). Moderate

	Year of studies	n	Mean	SD	F	p
Total score - TMD	3 rd year	36	20,69	16,13	1,490	0,220
	4 th year	40	29,75	19,81		
	5 th year	30	24,50	17,54		
	6 th year	33	26,97	22,77		
Total score – Scale of perceived stress	3 rd year	36	18,61	5,92	0,412	0,745
	4 th year	40	18,08	4,72		
	5 th year	30	17,50	3,62		
	6 th year	33	17,42	5,51		

n – size of sample, Mean- arithmetic mean, SD-standard deviation F- Fisher test (ANOVA), p-probability of zero hypothesis rejection with 5% risk

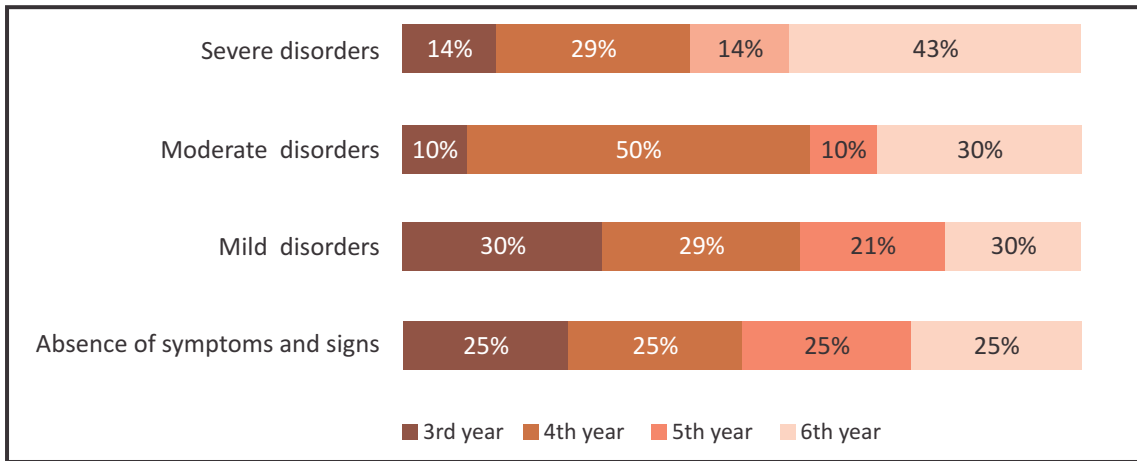
Table 4
Comparison of TMD and SPS levels in subjects between years of studies

disorders were most commonly used by subjects from the fourth year (50,0%), while the highest percentage of severe TMD was shown by the subjects from the sixth year. With regard to the prevalence of perceived stress (SPS) in students according to the year of studies (Graph 2.) it was ascertained that the moderate stress level was most commonly present in the fourth-year students while the biggest percentage of high stress level was present in the third-year students (83,3%). By one way analysis of variance of independent samples the differences in mean values of TMD level and SPS were tested in subjects from different years of studies. The analysis of variance has not proved the statistical significance among groups TMD $p < 0,220$; SPS; $p < 0,745$. (Table 4.). The association between perceived stress and TMD symptoms for subjects from each year of studies was researched by using Pearson's linear correlation. There is a correlation between perceived stress and

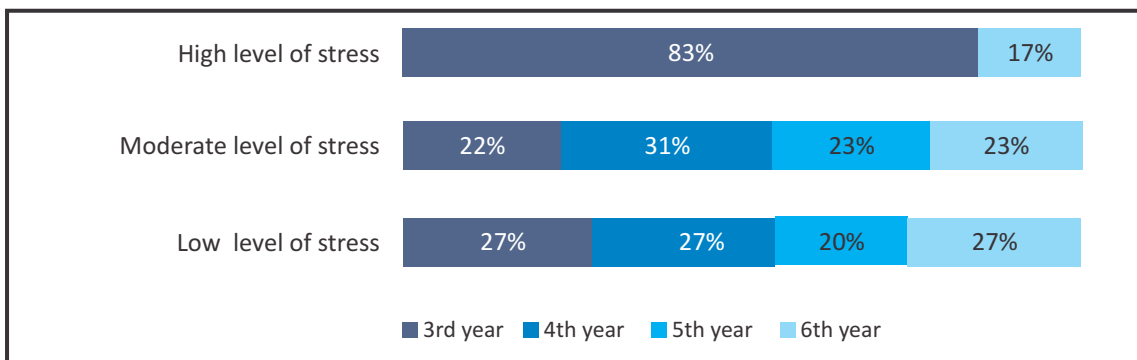
TMD symptoms in third ($r=0.466$; $p < 0.004$) and sixth-year ($r=0.418$; $p < 0.016$) students confirmed by realized mean positive coefficients of Pearson's linear correlation shown in Graphs 3.and 4.

Discussion

Etiology of TMD is not clearly differentiated and as such it is considered multifactorial. Among all potential causes of TMD the behavioral and psychological factors are considered as most significant in etiology. As for student population, particularly in medical schools or health related faculties, a great number of studies indicates that in general those students have higher levels of perceived stress than their peers in general population [23-25]. The results of this research have



Graph 1
Prevalence of level of TM disorders according to the year of studies of subjects



Graph 2
Prevalence of the level of SPS disorder according to the year of studies of subjects

shown that the mean values of the total score of TMD indicate the presence of mild TM disorders in all groups of students. The highest values were present in fourth-year students, then sixth year and fifth-year students while the lowest mean value of TMD score was present in third-year students (Table 2.). The highest mean value of the total score of SPS was shown by the subjects of the third and fourth year of studies while the lower stress level was shown by the subjects from the fifth and sixth year of studies of the Faculty of Dentistry University of Sarajevo (Table 3.).The explanation for these results lies in the fact that third-year students are faced for the first time with a dental workplace while perceived stress in fourth-year students indicates their fear of new challenges in the clinical work with patients. TMD symptoms were present in students from all years of

studies. In view of prevalence mild TMD were most commonly shown by subjects from the third year, moderate TMD were shown by fourth-year students while severe TMD were shown by sixth- year students (Graph 1.) Out of the total number 25% of students in each group have not shown the presence of TMD.

The previous study examined the presence of TMD in 212 students using Fonesca Anamnestic Index and correlated risk factors while for the estimate of the stress level of SPS the results have shown that the subjects had mostly mild TMD (60,5%), and only 4,6% with a severe TMD.

The subjects with TMD had 1,15 times higher perceived stress than those without TMD [26] which is in accordance with the results of this research. The

high stress level in this research has been shown only by third and sixth-year students (Graph 2.). Stress is an important risk factor for the emergence and persistence of TMD in students of dental medicine. The source of stress correlated with the study of dental medicine pertains to the specific nature of job, preclinical and clinical work with patients and the successful outcome. Many studies have proved that students with higher stress level have a higher prevalence of TMD symptoms and signs

[5,8,17,19,27]. This research has proved the positive correlation between perceived stress and TMD symptoms in third and sixth-year students. The third and sixth-year students with a high stress level had a significantly higher prevalence of TMD.

The previous study including 586 students registered the presence of TMD and perceived stress and thus proved their correlation which is in accordance with this research. The results have shown the highest percentage of mild disorders up to 50 %, then moderate disorders and 5,5% of severe disorders. In this research the third and sixth-year students have shown a severe TMD and a high level of stress. This can be explained by their awareness of responsibility inherent to this profession, but also the uncertainty after the completion of studies. Many studies have proved the correlation between stress, anxiety, depression and TMD with stress causing changes such as the increased muscle activity [29-34]. It is important to evaluate stress in students because it impacts their academic success and can also influence their perception and decision making. High stress level can lead to anxiety and depression, and because of that, it is vital to recognize the presence of stress in order to act in a preventive manner, establish an early diagnosis and carry out appropriate therapy.

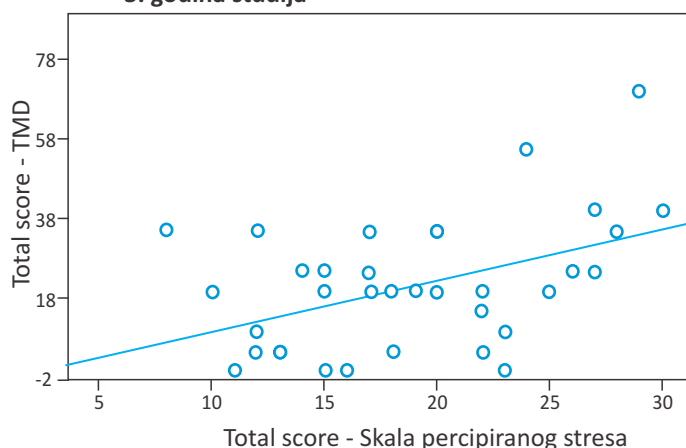
The limitation of this study is a small sample indicating a need for research that would include a bigger sample regarding stress perception and TMD presence in students from other faculties of dental medicine and medicine in Bosnia & Herzegovina in order to create legitimate foundations for comparison of the results with other faculties.

Conclusion

TMD and perceived stress were present in students from all years of studies. The prevalence of TMD symptoms and the level of perceived stress were different with regard to a particular year of studies. The students from the third and sixth year who had a higher level of perceived stress also had higher prevalence of TMD symptoms.

There is no conflict of interest.

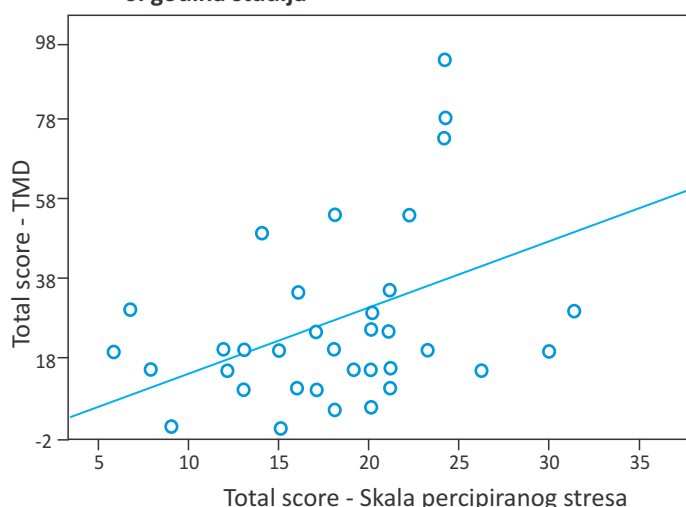
3. godina studija



Graph 3

Correlation of TMD score and the Scale of perceived stress in third-year students

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Graph 4

Correlation of TMD score and the Scale of perceived stress in sixth-year students

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