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LEVEL OF DENTAL ANXIETY AND STRESS IN PATIENTS WITH ORTHODONTIC APPLIANCES

НИВО НА ДЕНТАЛНА АНКСИОЗНОСТ И СТРЕС КАЈ ПАЦИЕНТИ СО ОРТОДОНТСКИ АПАРАТИ

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Abstract

Fear and anxiety of dentist and dental treatment are widespread problems that results in a significant barrier to the receipt of dental care. It can cause treatment difficulties for the practitioner as well as severe consequences for the patient. The level of stress can be evaluated directly or indirectly by psychometric tests. **Aim:** The aim of this study is to examine dental anxiety and stress in two groups of patients: children with orthodontic anomalies wearing removable orthodontic appliances, and children with caries on primary and permanent teeth. **Material and methods:** We examined two matched groups of patients: children with orthodontic anomalies (N = 31, mean age 10.3 ± 2.02) years and children with ordinary dental problems (N = 31, mean age 10.3 ± 2.4 years). Both genders were presented equally. As for psychometric instruments, we used 45 items Sarason's scale for assessing anxiety level, and 20 items simple Stress - test adapted for children for obtaining the level of stress. **Results:** The obtained results confirmed the presence of moderate anxiety in both groups as well as moderate stress level. For Sarason's test, the obtained scores for the group with dental problems are 20.63 ± 8.37 (from max 45); and for Stress test 7.63 ± 3.45 (from max 20); for the orthodontic group obtained scores are 18.66 ± 6.85 for Sarason's test, while for the Stress test were 7.76 ± 3.78. One way ANOVA confirmed significant.difference.in.values.of obtained scores related to age. Calculated Student t-test shows non-significant differences in obtained test results for both groups of examinees (t-test was > 0,05). **Conclusion:** This study confirmed that moderate anxiety and relatively normal stress level are present in both groups of patients (orthodontic and dental). The obtained results depend on age (one way ANOVA). **Key words:** dental anxiety, stress, orthodontics, assessment.

Апстракт

Стравот и анксиозноста од стоматолог и денталниот третман е широко распространет проблем кој резултира во значителна бариера за прифаќање на стоматолошката грижа. Може да предизвика потешкотии во третманот за докторот, како и тешки последици за пациентот. Нивото на стрес може да се евалуира директно или индиректно со психометриски тестови. **Цел:** Целта на оваа студија беше да се евалуира анксиозноста и чувството на стрес кај две групи пациенти, ортодонтски, односно деца кои носат мобилни ортодонтски протези, и педодонтски пациенти - деца со присуство на кариес на млечни и трајни заби. **Материјал и метод.** Примерокот содржеше две групи деца: деца со ортодонтски апарати (31 дете, средна возраст 10.3 ± 2.02 години) и деца со вообичаени дентални проблеми (31 дете, средна возраст 10.3 ± 2.4 години). Двата пола беа еднакво застапени. Беа употребени следниве психометрички тестови: Sarason's General Anxiety Scale - Сарасон скала за одредување на нивото на анксиозност и едноставни Стрес тестови адаптирани за деца за одредување на нивото на стрес. **Резултати.** Резултатите од Sarason тестот за анксиозност за ортодонтската група беа 18.66 ± 6.85, а за стрес тестот 7.76 ± 3.78. За групата деца со дентални проблеми резултатите беа 20.63 ± 8.37 и 7.63 ± 3.45, соодветно. Добиените вредности кореспондираат на ниво на средна анксиозност (од max 45) за Sarason тестот и ниско ниво на стрес (од max 20) од стрес тестот. ANOVA тестот покажа сигнификантна разлика во збирните вредности добиени со Sarason скалата за анксиозност по однос на возраста, во двете групи испитаници. Студентовиот t-тест покажа несигнификантна разлика во добиентите резултати од тестот за двете групи испитаници. **Заклучок:** Студијата потврди умерена анксиозност и релативно нормално ниво на стрес кај учениците под дентален и ортодонтски третман. Најдените збирни вредности за психометриските тестови се сигнификантно варијабилни во согласност со возраста. **Клучни зборови:** дентална анксиозност, стрес, ортодонција, проценка.

Introduction

Fear and anxiety of the dentist and dental treatment are widespread problems that results in a significant barrier to the receipt of dental care. It can cause treatment difficulties for the practitioner, as well as severe consequences for the patient. The level of stress can be evaluated directly or indirectly by psychometric tests.

As a physiological and psychological state characterized by cognitive, physiological and behavioural components, anxiety and its related conditions are one of the most prevalent psychological disorders in the general population[1].

In children, anxiety can be expressed by exclamations, choleric accesses, stupefaction or the urge of hanging on to something. Often, children do not admit

that their fear is excessive and they rarely relate their phobias.

Psychology and behavioural sciences have become increasingly important in dental education, clinical practice and research over the last twenty years. The incidence of dental anxiety and phobia ranges from 10% to 30%, depending on several factors such as nationality, socio-economic background and conditions, previous distressing experiences and type of intervention[2].

Dental anxiety is defined as a patient's response to stress that is specific to the dental situation. It is the most common psychological condition seen in dentistry and affects a significant percentage of the population. Because of this reason, it is well documented that dentists deal with anxious patients in their daily practice. Anxiety in patients influences both the psychology (e.g., avoidance of dental care) and the physiology (e.g., palpitations, nausea) of the dental experience, which leads to a variety of behaviours that impact dental care, such as delay and avoidance of dental treatment[3].

Dental anxiety was first studied by Shoben and Borland in 1954, who explained that this avoidance behaviour results from unfavourable attitudes toward dentists on the part of family members and a history of painful dental experiences. Dental anxiety not only leads to avoidance of dental care, but it may also affect individuals, generally by causing sleep disturbance, negative thoughts, and feelings of low self-esteem and confidence[4]. It was also described by Klingberg and Broberg as a state of apprehension that something dreadful is going to happen in relation to dental treatment or certain aspects of dental treatment[5].

As such, it has impact both on the patient and on patient management and treatment. Surveys indicate that a substantial proportion of the general population avoids making regular visits to the dentist because of their anxiety. That behaviour can be detrimental for them because untreated dental disease (e.g., periodontal disease, dental caries) leads to poorer oral health, reduced dental visits, and, consequently, poorer oral-health-related quality of life[5,6,7,8].

Dental anxiety is ranked fifth among commonly feared objects or situations. It is the most common psychological condition seen in clinical practice, and it affects a significant percentage of the population. There is a significant variability in the prevalence of dental anxiety reported in literature. Epidemiological studies suggest that between 3% and 20% of the population are anxious or have levels of fear about dental treatment[1,3,5].

The etiology of dental anxiety has been attributed to many factors, such as personality characteristics, traumatic or painful dental experiences in childhood, learned attitudes toward dental services that elicit fear from dentally anxious family members or peers, perception of body image, blood injury fears and pain reactivity[8].

According to Locker, several theories exist that attempt to explain the etiology of dental anxiety. Three main etiological hypotheses for explaining the cause of dental anxiety have been suggested, as follows: conditioning responses to aversive dental experiences, heightened pain sensitivity and/or fear of dental pain, and predisposing personality characteristics[9].

Other factors contributing to dental anxiety are gender (most of the studies report higher anxiety among females), age (young subjects tend to be more anxious than older individuals), personality, family members' fear, previous dental treatment experiences and type of intervention, subject's education level (patients with higher education level demonstrated lower dental anxiety), income level, and cultural background[10,11].

Anxiety in orthodontics

A significant number of patients were also identified as anxious about seeing an orthodontist. The prevalence of those anxious about orthodontic treatment was slightly lower than those anxious about dental treatment. Although the prevalence of dental anxiety is well-documented, less information is available about the prevalence of dental anxiety among orthodontically treated patients, most likely because of the lack of commonly reported evoking stimuli drill and needle associated with dental anxiety.

Orthodontic treatment remains associated with pain despite improvement in techniques or practitioners' technical abilities. Discomfort related to orthodontic treatment has been reported as one of the most negative aspect of treatment and is ranked fourth among major concerns and worries prior to orthodontic treatment.12 In dental literature, it is well documented that fear of pain is one of the possible etiologies of dental anxiety. Although pain is subjective, a certain discomfort is unavoidable during orthodontic treatment. Recent literature stated that some orthodontic procedures such as separator placement, arch wire placement and activations, application of orthopaedic forces, and debonding produce pain in patients. It has also been suggested that patients treated with fixed appliances, experience more pain than removable or functional appliances[1,10,12].

The aim of Prabhat et al., study was to examine the pain experienced by patient after the mini screw implant placement, and the dental anxiety that might influence the pain experience. The study showed a positive linear relationship between dental anxiety and patient pain experience following mini screw implants placement[6].

Pain experienced during orthodontic treatment can be a reason for discontinuing or delaying orthodontic visit

which not only prolongs treatment duration, but may also result in poor oral hygiene, compromised periodontal status, low self-esteem, and general well-being[10].

In their observational clinical study, Vaida et al., consider that the most important stress-generating sources, before, as well as, after the application of the orthodontic devices, are the patient's negative thoughts concerning the social integration, and also the family integration, the attitude of the entourage as in "what are my colleagues going to say when they they see me wearing it", the difficulties during speech or eating, the duration of the treatment (2-3 years average) also the need for check-ups, and activating sessions. They also concluded that the reduction of the anxiety level is mandatory at the beginning of the orthodontic treatment. Therefore, a basic set of child psychology knowledge should increase the competence and professionalism of the orthodontist[8].

Also, Trakyali et al. said that it would be useful to overcome the increased state of anxiety of the child in the orthodontic clinic by using educational and relaxation techniques[13].

In our country there is a study for dental anxiety from Sarakinova, Pop Jordanova et al., on 50 school children. They found high level of anxiety in children undergoing dental interventions, with higher results for the girls[14].

Aim

The aim of this paper is to evaluate the level of anxiety and stress in two groups of children with orthodontic anomalies, wearing removable appliances, and in children with ordinary dental problems, caries on primary and permanent teeth.

Material and method

The evaluated sample was comprised of two groups of schoolers: a) children with orthodontic problems (anomalies in shape, position and function of dentofacial structures), wearing removable appliances (N=31, mean age 10.3 ± 2.02 years); and b) children with ordinary dental problems, caries on primary and permanent teeth (N=31, mean age 10.3 ± 2.4 years). Both genders were presented equally. Examinees were selected randomly.

The following psychometric tests were used: Sarason's General Anxiety Scale for assessing anxiety level and Stress test for children for obtaining the level of stress[15,16].

The Sarason's General Anxiety Scale for Children (GASC) is a 45-item yes/no scale for using with children from primary school. It measures chronic, generalised anxiety that is aroused in children by test situations. The items of the GASC are concerned with attitudes toward, and experiences in, test and test-like situations. The obtained score of 12 (yes answers) or below, ranks in the low anxiety range. A score of 12-20 ranks in the medium range. Any score above 20 signifies high anxiety. Scoring 15 or higher is a good indication that a child experiences considerable discomfort about the situation in which it is[15].

Stress-test is a simple yes/no 20-item questionnaire where the higher scores are related to higher stress level[16]. Tests were verbally administrated and were conceptualized as a single dimension measured by 45/20 items using yes/no response format.

The psychological tests in this study were applied prior to dental intervention. Children were usually accompanied by their mothers, who gave prior consent for the study.

For statistical calculations, the online package Statistics 8 was used.

Results

Two groups of examinees were included: a) 31 children with orthodontic problems, mean age 10.3 ± 2.02 years; and b) 31 children with simple dental problems, mean age 10.3 ± 2.4 years. Examinees were matched by age and gender.

Evaluated by Sarason's anxiety test, the obtained scores for the group with orthodontic problems were: 18.66 ± 6.85 using Sarason's anxiety tests, and 7.76±3.78 using Stress test. The obtained scores in the group with dental problems were: 20.63 ± 8.37 (from max 45); these

Table 1. Obtained results from the test in both groups

Orthodontic patients	Dental patients	Test
18.66 ± 6.85	20.63 ± 8.37	Sarason's anxiety test
7.76 ± 3.78	7.63 ± 3.45	Stress-test

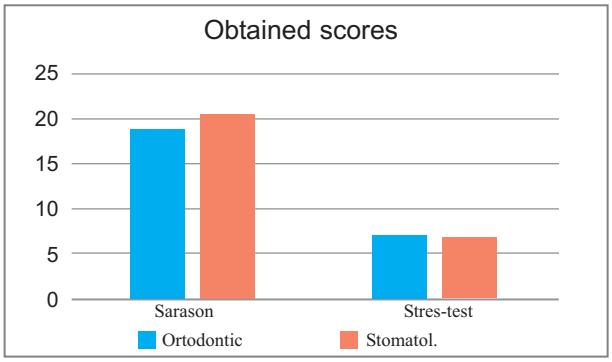

Figure 1. *Obtained scores for both psychometric test in orthodontic and dental patients*

Table 2. ANOVA-related-age and scores using stress-test in both groups

a)orthodontic group

Effect	Sum of Squares	Degr.of freedom	Mean Square	F-value	p-value
Intercept	2229.803	1	2229.803	400.6634	0.000000
Stress test	110.125	11	10.011	1.7989	0.129696
Error	100.175	18	5.565		

b)dental group

Effect	Sum of Squares	Degr.of freedom	Mean Square	F-value	p-value
Intercept	2229.803	1	2229.803	400.6634	0.000000
Stress test	110.125	11	10.011	1.7989	0.129696
Error	100.175	18	5.565		

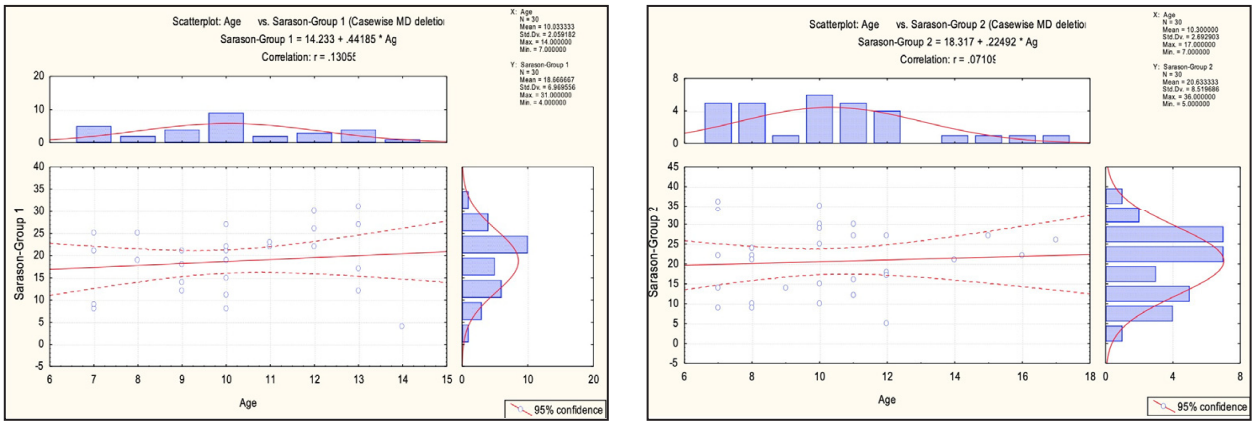

Figure 2. *Correlation between age and scores obtained with Sarason's anxiety test*

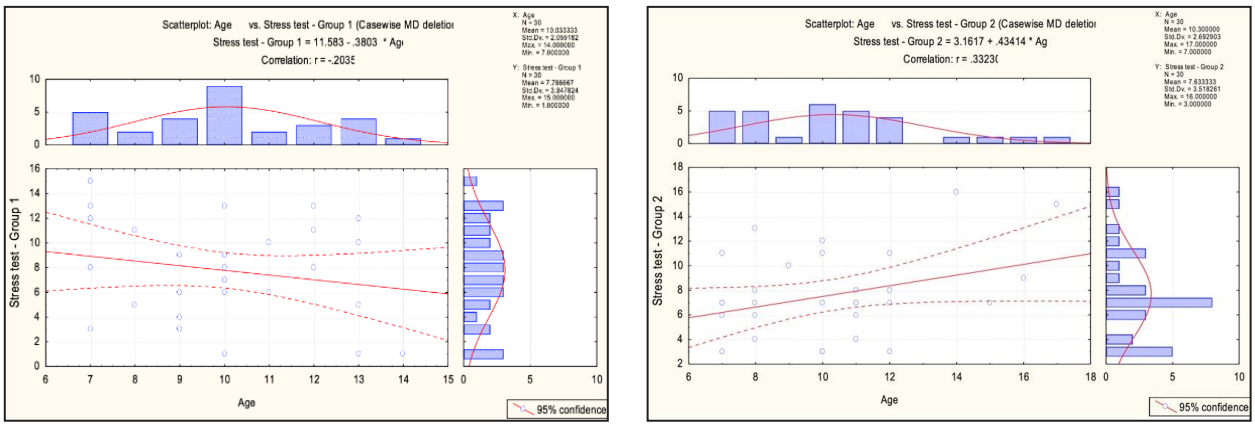

Figure 3. *Correlations between age and obtained scores with Stress-test in both groups of examinees*

results correspond to moderate anxiety level. Evaluated by Stress test 7.63±3.45 (from max 20), which correspond to small stress level. (Table 1, Figure 1).

Calculated one-way ANOVA showed a significant variance in scores obtained using Sarason's anxiety scale related to age in both groups of patients.

Calculated one-way ANOVA for the significance of age in stress test is presented in Table 2. In this calculation, results also confirmed the influence of the age on the variance of the obtained scores.

The correlation between age and scores evaluated by Sarason's anxiety test is shown in Figure 2. There was a small positive, not significant correlation between the two mentioned variables (r = 0.13; r = 0.7, respectively).

The correlation between scores obtained with Stress-test for both groups of patients is shown in Figure 3.

As it can be seen, the correlation between age and obtained scores using Stress-test is negative for orthodontic patients (r= - 0.20), but positive for dental patients (r=0.33).

Finally, we used Student's t-test for obtained scores in both groups for both psychometric tests (Figure 4 and 5).

The Student's t-test showed no significant differences in obtained scores for both tests in both groups of examinees (t-test > 0.05).

	T-test for Independent Samples (Copy of sarakinova-excel 97) Note: Variables were treated as independent samples										
Group 1 vs. Group 2	Mean Group 1	Mean Group 2	t-value	df	p	Valid N Group 1	Valid N Group 2	Std.Dev Group 1	Std.Dev Group 2	F-ratio Variances	p Variances
Sarason-Group 1 vs. Sarason-Gr	18.6666	20.6333	-0.9786	58	0.33183	30	30	6.96955	8.51968	1.49429	0.2852

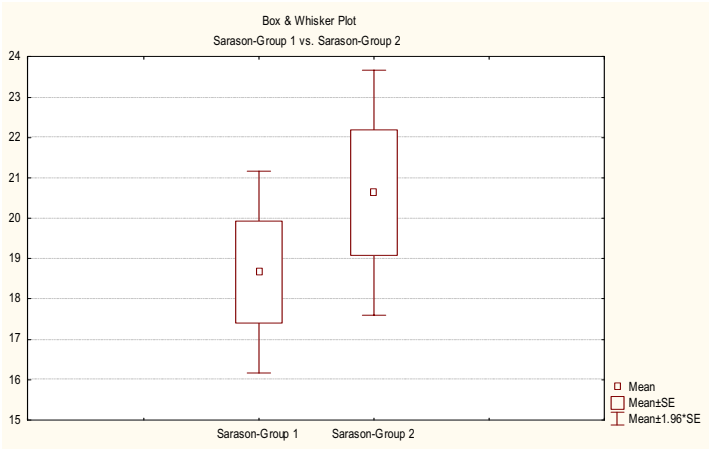

Figure 4. *T-test for scores obtained for Sarason's anxiety test in both groups*

	T-test for Independent Samples (Copy of sarakinova-excel 97) Note: Variables were treated as independent samples										
Group 1 vs. Group 2	Mean Group 1	Mean Group 2	t-value	df	p	Valid N Group 1	Valid N Group 2	Std.Dev. Group 1	Std.Dev. Group 2	F-ratio Variances	p Variances
Stress test - Group 1 vs. Stress test - Group 2	7.76666	7.63333	0.14006	58	0.88909	30	30	3.84782	3.51826	1.19611	0.63283

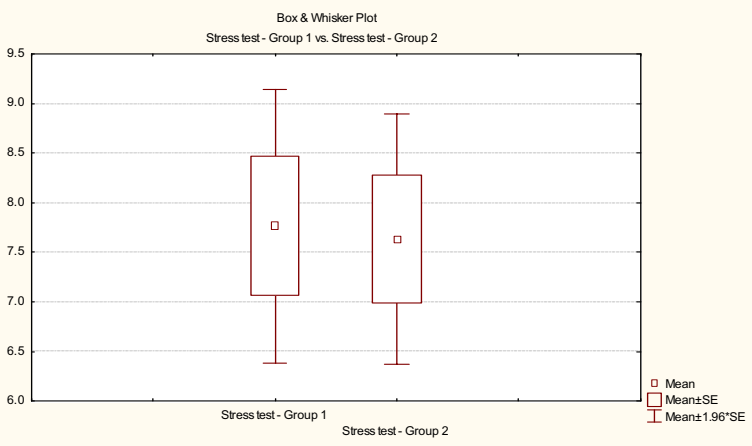

Figure 5. *T-test for scores obtained for Stress-test in both groups*

Discussion

Orthodontic science puts itself before other specialties of the dental medicine by the type of patients it refers to, children and adolescents. In most of the patients who have dento-alveolar abnormalities, the abnormality itself is a stress-generating factor. The stress level is different due to the degree in which it affects physiognomy and personal variables. To this primal stress factor, we add the anxiety and distress generated by the medical act itself, as to "what's going to happen to me". Children often confound the orthodontist to a pedodontist, the person who treats their cavities. Another major stress-generating factor is, at the beginning of the treatment, the patient's cognitions concerning the aspect of the orthodontic device, the difficulties of wearing it, and especially the social integration in the family and in society.

The results of our study revealed the presence of moderate anxiety and relatively low-stress level in evaluated school children in both groups (orthodontic and dental settings).

These results differ from the previous study by Pop Jordanova et al., from 2013 where obtained dental anxiety scores were more accentuated, and the same were higher for girls compared to boys[14]. We suppose that the level of anxiety/stress was not so high as a result of productive coping styles used by children in dental setting as well as the education in primary school for the need of dental health. Our results are quite similar to most of other studies in this context.

Bhola[7] reported moderately high levels of anxiety with score of 60,75% in India. Because the time of the orthodontic treatment and the first probable visit coincided in many of the individuals, their anxiety was cumulative to both. They were anxious due to the various complex treatments, wires, and long durations of the orthodontic therapy.

In study by Khokhar, 46% of the participants had mild anxiety score whereas only 4% of the participants experienced severe anxiety[11].

In their study, Surabhi et al., found that 45% of the participants had mild anxiety, 32.5% of the participants had moderate level anxiety, 17% of the participants had high anxiety, whereas only 5.5% of the participants experienced severe anxiety or phobia[10].

Using the Sarason's anxiety test, a very small positive, but not significant correlation was obtained for age and scores, while using the Stress-test, the calculated correlations between age and scores were positive for dental, and negative for an orthodontic group of patients, but without statistical significance.

In 2007, Klingberg and Broberg published a review about prevalence of dental anxiety in children and adolescents. They found a decrease in prevalence with age in some studies they reviewed. They concluded that the decrease of dental anxiety with age may be due to normal psychological development[5].

The prevalence of dental anxiety in specific age groups has been studied by numerous authors, and there are a lot of controversies among those studies. According to Roy,1 a few studies have found no significant difference in dental anxiety level between different age groups, while recent literature reports an association between age and dental anxiety, with younger subjects being more dentally anxious than older individuals. He also added that, comparing results from studies using different dental anxiety measures as well as inconsistency in the use of cut points to define clinically significant anxiety lead to variation in the prevalence of anxiety.

The purpose of this study was to create an awareness of the problem by assessing the dental anxiety among orthodontic patients, so that anxious and fearful orthodontic patients can be facilitated accordingly.

Although studies[17,18] have assessed several aspects of anxiety related to dental treatment, no research in our country has investigated dental anxiety among patients receiving orthodontic treatment. This could be because dentists and orthodontists assume that their patients are not anxious because orthodontic treatment is not associated with dental drilling or injections for local anaesthesia, which are two of the most commonly cited stimuli associated with dental anxiety. However, pain is often cited as a cause of dental anxiety, and pain experienced during orthodontic treatment has been reported as the worst aspect of treatment by some patients and a primary reason for wanting to discontinue orthodontic care[1]. Some studies[19] reported moderate pain experienced by 62% of the patients and others[20] even 95%.

The data collected from this kind of studies will provide better understanding of the nature of anxiety in orthodontic patients as it relates to their treatment. This will hopefully benefit both orthodontists and patients by providing a more enjoyable treatment experience.

Conclusions

In conclusion, the study confirmed moderate anxiety level, and relatively normal stress level in school children undergoing orthodontic and dental interventions. The obtained scores for psychometric tests are significantly different according to age (one way ANOVA).

No significant differences were observed between mean values of scores in both groups of examinees, and for both psychometric tests. Using the Sarason's anxiety test, a very small positive, but not significant correlation was obtained for age and scores. Calculated correlations between age and scores, using the Stress-test, was positive for the dental, and

negative for the orthodontic group of patients, but without statistical significance.

Determining the prevalence of dental anxiety in orthodontics as well as the factors contributing to it will create an awareness of the problem and will help clinicians to identify patients who are anxious, and to facilitate appropriate treatment and management during orthodontic treatment.

In our country, we need further evaluation of dental anxiety in orthodontics and in other dental specialities on larger number of patients to obtain more concrete results.

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