INVESTIGATION OF THE SPEECH IN PATIENTS WITH BRUXISM – A PILOT STUDY

Mariana Dimova-Gabrovska
Medical University - Sofia, Bulgaria marianadimova@abv.bg
Desislava Dimitrova
Dental Clinic ”Edinstvo” – Sofia, Bulgaria desislavvva23@gmail.bg
Marina Mitova
Divane- logopedic workshops – Sofia, Bulgaria eve.mitova@gmail.com

Abstract: Bruxism is a condition of clenching or grinding teeth, often found in many children and adults. It is associated with rhythmic contractions of chewing muscles in static states, which often leads to a number of consequences. Patients' main complaints include tension, pain, tenderness in chewing muscles, erosion / wear of hard tooth tissues, reduced bite height, disturbance in aesthetics, etc. All this causes a disturbance of the chewing function. Parts of the structures involved in the mastication system are also a major part of the articulation apparatus, responsible for the performance of the speech. The changes in these structures, in case of bruxism, would also lead to the occurrence of pathological speech and articulation violations. This suggests a possible link between the various functional disturbances in the orofacial area. There is not big number of science papers on this subject, but available ones point to the interdependence between the degree and the manifestation of the signs and symptoms of bruxism and the violations in the articulation of consonant sounds. There have been found records, the results of which show that speech disorders occur twice as often in patients with deviations from normal occlusal interrelations for various reasons, and that speech disorders are the most common in logopedic practice. All this also determine the purpose of this study, exactly, a study of speech and assessment of articulation disorders in patients suffering from bruxism. The study includes 11 subjects aged 23 to 61 years who are diagnosed with bruxism after preliminary clinical functional analysis, manual analysis and occlusal diagnosis in DGFDT cardboard sequence. They are subjected to logopedic examination by a specialist - speech therapist, which is consisted by several parts. First - the structures of the articulation apparatus - lips, tongue, teeth, dental rows, jaws, palate, etc. are initially reviewed and evaluated. By dint of a role-playing test - their mobility, speed and ability to switch movements are also assessed. In the next stages, the sound performance of all vowels and consonants - individually, in the syllables (right, reverse, mixed) and followed (in a connected speech) is evaluated. A sample for phonematic sound perception, as well as anexamination of the mimics, is also made. The presence of sigmatism in all bruxists is established - a disturbance in the reproduction of consonant sounds from the group of the s-sounds (fizzle sounds, in Bulgarian language – *с, з, ц* sounds) and the shush sounds (in Bulgarian language – *ш, ж, ч, щ* sounds), as well in their own pronouncement, in syllables also in continuous speech. Patients show good self-control of impaired articulation. There is no deviation in the articulation of the sonorous consonants (in Bulgarian language – *р, л* sounds), as well as in the vowels. The data obtained can be of great benefit in the future development of a diagnostic speech test in patients with bruxism.

ИЗСЛЕДВАНЕ НА ГОВОРА ПРИ ПАЦИЕНТИ, СТРАДАЩИ ОТ БРУКСИЗЪМ – ПИЛОТНО ИЗСЛЕДВАНЕ

Мариана Димова-Габровска
Медицински университет–София, България marianadimova@abv.bg
Десислава Димитрова
Дентална клиника”Единство” – София, България desislavvva23@gmail.bg
Марина Митова
Диване- логопедична работилница – София, Българияeve.mitova@gmail.com

Резюме:Бруксизма е състояние на стискане или скърцане със зъби, което често се среща при много деца и възрастни. То е свързано с ритмични контракции на дъвкателните мускули в статично състояния, което често довежда до редица последици. Основните оплаквания на пациентите са от напрежение, болка, чувствителност в дъвкателните мускули, изтриване/износване на твърдите зъбни тъкани, намалена височина на захапката, нарушение в естетиката и др. Всичко това обуславя нарушаване на дъвкателната функция. Част от структурите, участващи в мастикаторната система, са и основна част на артикулационния апарат,

отговорен осъществяване на говора. Изменението в тези структури, при бруксизъм, съответно биха довели и до поява на патологична реч и артикулационни нарушения. Това предполага евентулна връзка между различните функционални нарушения в орофациалната област. Съществуват не голям брой литературни данни на тази тема, които сочат за взаимозависимост между степента и проявата на признаците и сиптомите на бруксизъм и нарушенията в артикулацията на съгласните звуци. Открити са разработки, чиито резулатати показват, че нарушението в говора се среща два пъти по-често при пациенти с отклонение от нормалните оклузални съотношение по различни причини, както и че в логопедичната практика артикулационните нарушения са най-често срещаните. Всичко това обуславя и целта на настоящото изследване, а именно изследването на говора и оценка на артикулационните нарушения при пациенти страдащи от бруксизъм. В изследването са включени 11 обекта на възраст от 23 до 61 години, на които им се поставя диагноза бруксизъм след предварителен клиничен функционален анализ, мануален анализ и оклузалана диагностика в последователност на картона на DGFDT. Те са подложени на логопедично обследване от логопед-специалист, което се състои в няколко етапа. Първоначално са прегледани и оценени структурите на артикулационния апарат – устни,език, зъби, зъбни редици, челюсти, небце и др. Чрез подраженчески тест е оценена и тяхната подвижност, бързина и възможност за превключване на движенията. В следващите етапи се оценява звукопроизношението на всички гласни и съгласни – поотделно, в срички(права, обратна,смесена) и последвано (в свързана реч). Направена е и проба за фонематично възприятие на звуковете, както и изследване на мимиките. Установява се наличието на сигматизъм при всички бруксисти – нарушение в звукопроизношението на съгласни звукове от групата на съскавите (с, з, ц) и шушкавите (ш, ж, ч, щ) звуци, както при самостоятелно им произнасяне, така и в срички и непрекъсната реч. Пациентите показват добър самоконтрол на нарушената артикулацията. Не се установява отклонение в артикулацията на сонорните съглани (р,л), както и при гласните. Получените данни могат да бъдат от изключителна полза при бъдещо изработване на диагностичен тест за изследване на говора при бруксисти.

1. INTRODUCTION

Often, craniomandibular dysfunctions (CMD) are associated with conditions such as bruxism. According to the literature [1] its distribution is 8-31% of the total population, which makes it common. Despite numerous studies on the relationship between the form and function of orofacial structures, and in particular of bruxism as a para-function, the possibility of a relation between the various functional disturbances in this area has not yet been fully elucidated.

Speech is a basic structural unit of the language and is an indispensable part of everyone's everyday life. Speech activity is manifested at the psychological, physiological and physical level. Proper implementation of the speech required proper conditions in each of these directions. [2] Regarding to the physiological level, it is related to the condition of the orofacial structures - teeth, dental lines, jaws, mimic and chewing muscles, tongue and sublingual frenulum, hard and soft palate.Of particular importance are also the type and the height of the bite, the mobility of the tongue, proper breathing, salivation, etc. [3] In cases of bruxism, a disturbance in the function and / or structure of some of these elements may occur, such as: loss of hard tooth tissues, change in angle of formation of the dental rows, bite changes, hypertrophy and tension in mimic and chewing muscles, incorrect position of the tongue, etc. [4] This would undoubtedly lead to a change in articulation and proper sound extraction.

Ettala-Ylitalo and Laine [5] discover a positive relationship between craniomandibular dysfunctions and in particular bruxism and articulatory speech disorders in children aged 6-8 years. They conduct a comparative study in Finland with children with speech disorders and healthy ones. They report the prevalence of symptoms and signs of mandibular dysfunction in children with incorrect articulation of the S- and R- sounds. Pahkala [6] also explores the changes in the function of the masticatory system in relation to articulatory speech disorders, but in children aged 7-10 years. He also found a higher prevalence of the symptoms of craniomandibular dysfunctions and bruxism in children with speech disorders such as increased chewing muscles sensitivity, incorrect occlusal interrelations, and so on. Years later he conducted a new study of the same children, which are already aged 10-15 years [7]. Not only the results obtained from the previous study are confirmed, but the author also monitors the changes in the function of the masticatory system, which occurred during the growth. This gives him reason to conclude that chewing and talking are physiological functions that are very closely related to each other.

Egermär-Eriksson [8] finds that speech disorders occur twice as often in children who have changes in occlusal interrelations. Also interesting is the research of Laine [9], which explores the relationship between occlusal anomalies and violation of sound articulation in Finnish students. He finds out that all the wrong sounds found in the study are S, R, L, N and D sounds. It is discovered a positive relationship between the misarticulation of the S-sound

and the medial molar occlusion, as well as a relation between the open bite, incisal bite, reduced overlap and articulatory disturbances. It has been found [10] that impaired articulation of sounds is not the heaviest, but is the most common disorder in the production of the speech. All this give the authors a reason to conduct a pilot study on speech disorders in patients suffering from bruxism.

2. AIM

The purpose of this study is to identify speech disorders in patients suffering from bruxism.

3. METHODS AND MATERIALS

Objects of the study are 11 individuals aged 23 to 61 years suffering from bruxism. All patients are previously subjected to clinical functional analysis, manual analysis, and occlusal diagnostic in DGFDT cardboard sequence. The articulation possibilities were investigated by a speech therapist to identify the causes and specific manifestations of pathological speech. The speech research process takes place in several stages:

- First stage: primary view of the speaking apparatus - the speech therapist looks for potential problems in the structure of the different organs involved in the articulation apparatus - lips (density, mobility), tongue (length, thickness, mobility, length of the sublingual frenulum), height of bite, teeth, palate (high, low), jaws.
- A second stage in the investigation is an assessment of the mobility of organs that is tested by performing a series of role-playing exercises. Here the specialist looks for parameters such as accuracy, speed, smoothness, and switching of movements.
- The third stage includes the assessment of sound reproduction. The test covers the isolated pronunciation of individual sounds, followed in a related speech. Inaccuracies have to be noticed, such as replacement of sounds, incorrect pronunciation in words of varying length, and in syllable structure. Most often, violations affect sound reproduction of consonant sounds. The set of methods and materials for investigation encompasses all consonant sounds in different variants of syllables - right, inverse, mixed and with clustered consonants.
- It is important to note that the study includes a sample of the phonematic perception of the sounds - the hearing perception and their differentiation. Of the great importance is the differentiation between sounds with similar articulation and similar sound. The mimics are observed in terms of accuracy, amplitude and volume of movements, in order to eliminate the neurological origin of the problem.

4. RESULTS

In all patients (100%) the presence of sigmatism is detected - incorrect articulation of the sounds in Bulgarian – *С, З, Ц, Ш, Ж,Ч* (corresponding to the s-sounds in most of the languages) as this may include absence, replacement or distortion of the sounds. These sounds are divided into two groups –fizzle sounds or s-sounds(in Bulgarian language - *С, З, Ц*) and shush sounds (in Bulgarian language -*Ш, Ж,Ч*). In the pronunciation of the fizzle sounds, a deviation in the breath out air is observed. Normally it is positioned along the line passing between the central incisors and it is cold. In the investigated objects, a distraction of the air flow is detected; it is located in lateral areas and respectively, warmed by the cheeks. In the test of pronouncing syllables "su" and "so"(in Bulgarian language *"су", „со"*) together, by role-playing model, patients are significantly hampered, as this requires sudden change of mimic muscles from a condition "smile" in pronunciation of the syllable "su" –to "round„ condition in pronunciation of the syllable "so". The age of patients implies their good self-control and effort to correctly pronounce the s-sounds. In shush sounds, self-control is hampered and the disorders of their pronunciation are easily detected. For their articulation, it is necessary to lift the tongue into a specific posture–called "cup", in the performance to which, the bruxists find difficulty.

In five of the surveyed subjects (45%) is found a slight laziness of the tongue, a slight pulling forward and a difficulty in quickly switchingto different poses.

Although the sound "R" is considered to be the most difficult in articulation, in the investigated objects there is no violation of the articulation of this sound.

Concerning the labial sounds - M, N, P and B (in Bulgarian language *–М, Н, П, Б* –sounds) there is no particular deviation.

When studying the vocal sounds –good air flow and good vocalizing of the airflow are established.

The received results give a reason to put a hypothesis that there are speech disorders in patients with bruxism due to the changes in occlusion-articulation interrelationsin process of persistence of the dysfunctional condition. Confirmation or rejection of this hypothesis should be the subject of broader researches in such patients.

5. CONCLUSION

From the obtained results, it is clear that patients with evidence of bruxism suffer not only from a disturbance of the chewing function, proven in a number of studies, but also from disorders in speech function. Their subjective sensation makes them seek help from dentist, not only in terms of the symptoms of bruxism, but also in connection with difficult or incorrect articulation of certain sounds. This can be a major problem in people whose daily routine and professions are related to public speaking. This implies a future development of a diagnostic test for speech research in patients suffering from bruxism.

REFERENCES

[1] Manfredini D, Winocur E, Guarda-Nardini L, Paesani D, Lobbezoo F. Epidemiology of bruxism in adults: a systematic review of the literature. J Orofac Pain. 2013; 27(2): 99-110;
[2] Haynes W, Pindzola R. Diagnosis and evaluation in speech pathology, 8th edition. Pearson. 2012;
[3] Dodd B, Zhu H, Crossbie S, Holm A, Ozanne A. Diagnostic evaluation of articulation and phonology (DEAP). Psychology Cosporation. 2002;
[4] Shetty S, Pitti V, Satish Babu CL, Surendra Kumar GP, Deepthi BC. Bruxism: a literature review. J Indian Prosthodont Soc. 2010; 10(3): 141-148;
[5] Ettala-Ylitalo U, Laine T. Functional disturbances of the masticatory system in relation to articulatory disorders of speech in a group of 6-8-year-old children. Archs oral Biol. 1991; 36(3): 189-194;
[6] Pahkala R. Changes in function of the masticatory system from 7 to 10 years of age in relation to articulatory speech disorders. J Oral Rehabil. 1994; 21(3): 323-335;
[7] Pahkala R, LaineT. Changes in TMD signs and in mandibular movements from 10 to 15 years of age in relation to articulatory speech disorders. ActaOdontol Scand. 2000; 58(6): 272-278;
[8] Egermark-Eriksson I, Carlsson G, Ingervall B. Prevalence of mandibular dysfunction and orofacial parafunctions in 7-, 11- and 15-year old Swedish children. Eur J Orthod. 1981; 3 : 163-172;
[9] Laine T. Association between articulatory disorders in speech and occlusal anomalies. Eur J Orthod. 1987; 9:144-150;
[10] Baker R, Chenery H. Assesment in speech language pathology. Language Testing. 1999; 16(3): 243-247;