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A COMPREHENSIVE METHOD OF TREATMENT IN CHILDREN AND ADOLESCENTS WITH DISEASES OF THE TEMPOROMANDIBULAR JOINT SYSTEM

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Abstract: The study explores the processes of bone remodeling in the context of temporomandibular joint (TMJ) pathologies in children and adolescents, emphasizing their impact on mineral homeostasis and structural adaptation. The research aims to develop an effective diagnostic and comprehensive treatment approach for pediatric TMJ disorders. A clinical and dental examination was conducted on 300 children (130 boys and 170 girls), among whom 145 had TMJ pathologies (main group) and 155 were healthy controls. The study included a comparative analysis of clinical and biochemical data, integrating orthodontic and general treatment over 9 to 16 months. Diagnostic procedures involved clinical, biometric, and radiographic assessments. Results indicated significant oxidative stress and microbial contamination in TMJ-affected adolescents, along with a genetic predisposition to connective tissue dysplasia. Biochemical markers, including matrix metalloproteinases (MMP-1, MMP-3, and MMP-9), demonstrated substantial reductions post-treatment, while tissue inhibitor of metalloproteinases (TIMP-1) levels increased, indicating improved collagen integrity. Orthodontic evaluation revealed occlusal curve alterations and joint displacement patterns, further corroborating TMJ dysfunction. The study substantiates an 82% improvement in treatment efficacy through a combination of Wobenzyme, Omega 3-6-9, and orthodontic interventions. Early identification of metalloproteinase activity and connective tissue markers enables preemptive intervention, enhancing therapeutic outcomes. The findings underscore the necessity of integrating biochemical and orthodontic strategies for managing TMJ pathologies in pediatric populations.

Key words: Temporomandibular Joint (TMJ) Pathology, Bone Remodeling, Orthodontic Treatment, Matrix Metalloproteinases (MMPs), Oxidative Stress, Pediatric Dentistry, Connective Tissue Dysplasia.

Introduction

Expressed in a violation of the bone structure. The processes of active restructuring and renewal of bone structures that continue throughout life serve as an integral indicator of the metabolic activity of bone tissue. These processes, on the one hand, are an important mechanism for maintaining mineral homeostasis, on the other hand, they ensure the structural adaptation of bone to changing functional conditions [1]. The process of bone tissue remodeling is a mechanism aimed at preserving homeostasis, which is highly sensitive to various regulatory and controlling mechanisms, as well as to endogenous and exogenous influences. The purpose of the study. To determine an approach to effective diagnosis and comprehensive treatment in children and adolescents with TMJ pathologies. Materials and methods of research [2] .In order to select the studied group of patients, a clinical and dental examination was conducted among 300 children and boys (130 boys (43.33%) and 170 girls (56.66)), 145 of them with TMJ pathologies (the main group was OH) and 155 examined with absolutely no TMJ pathologies (the control group was KG) of secondary school students and colleges that were registered for medical examination and treated by a dental specialist at the Department of Orthopedic Dentistry of Bukhara and the regional children's and adult dental polyclinic of Bukhara (Table No. 1).

Table No. 1.

The group of examined children by gender and age, n=300

Age quantity		Total		Girls		Boys	
		quantity	in %	quantity	in %	quantity	in %
6-9 years **67/22,33%**	**OG**	25	8,33%	13	4,33%	12	4,06%
	KG	42	14%	22	7,33%	20	6,66%
10-13 years **100/33,3%**	**OG**	52	17,33%	30	10%	22	7,33%
	KG	48	16%	24	8%	24	8%
14-18 years **133/44,3%**	**OG**	68	22,66%	41	13,66%	27	9,0%
	KG	65	21,66%	40	13,33%	25	8,33%
Total **300/100%**	**OG**	**145**	**48,33%**	**84**	**28%**	**61**	**20,33%**
	KG	**155**	**51,66%**	**86**	**28,66%**	**69**	**23%**

In order to compare the clinical and biochemical results, our comprehensive treatment method was selected from 20 6-9-year-old children (group 1), 35 10-13-year-old children (group 2) and 48 14-18-year-old adolescents (group 3) who received specialist help and general treatment for 9 to 16 months were monitored an orthodontist's dentist; a control group of 15 children and adolescents from the practical healthy group (KG) served for them [3]. The diagnosis was established based on the anamnesis of clinical, biometric, and X-ray examination of patients and in accordance with the criteria for diagnosis: At the first stage of the diagnostic process, information received directly from the patient was collected and analyzed, and his subjective opinion was listened to about how the disease began and developed.; At the second stage, objective symptoms were established, and a detailed examination of the patient was performed [4] .In order to improve the effectiveness of diagnosis and treatment, a unified coding chart of clinical examination was developed, which includes a list of signs of TMJ pathology [5]. It is noted that adolescents with TMJ pathology have depletion of the reserve capabilities of antioxidant and antimicrobial protection against the background of increased lipoperoxidation processes and contamination of the mouth with pathogenic and conditionally pathogenic microflora, as well as a decrease in the stability of pH in saliva and a decrease in the level of cellular metabolism [6]. When assessing the genealogical history in this group, there was a burdened heredity not only for diseases of the gastrointestinal tract (80.8%), but also for diseases that develop against the background of undifferentiated connective tissue dysplasia (HDST), namely varicose veins of the lower extremities about the important role of HDST in the development of chronic pathology in children[7] . Consequently, the clinical and anamnestic markers identified at the first stage make it highly likely that adolescents with TMJ pathology have genetically determined CS [8]. At the same time, the MMP-3 index tended to decrease by an average of 2.5 times compared with the indicators of the group of children before treatment. An analysis of the results of the children in group 2 showed more pronounced changes in the studied indicators; MMP-1 after complex therapy had a similar dynamics as in children in group 1, i.e. decreased during therapy by an average of 48% compared with the group of children before treatment [9]. A decrease in the content of MMP-1 in children of group 2 against the background of complex therapy indicated a decrease in the expression of MMP-1, which denatures fibrillar collagen of the extracellular matrix. The analysis of the content of MMP-9 showed similar dynamics against the

background of complex therapy of children with TMJ, i.e. The level of MMP-9 decreased by 46% when compared with the group before treatment. More pronounced changes were observed with respect to MMP-3, where its concentration in children of group 2 decreased by an average of 4 times after complex therapy. As is known, the natural antagonist of MMP-1 is TIMP-1.An analysis of the results obtained in 2 groups of children after treatment showed an increase in TIMP-1 levels by an average of 20% compared with baseline values. An analysis of the results obtained regarding the dynamics of the studied indicators in the 3rd group of adolescents with TMJ pathologies showed that the level of MMP-1 in the blood of children after complex therapy has a more pronounced decrease dynamics by an average of 2.3 times relative to the group before treatment [10] . A similar trend was noted with respect to the dynamics of MMP-9, where its blood content decreased 1.6 times when compared with a group of children with TMJ before treatment[11]. More pronounced changes in the activity of metalloprotease-3 were noted in the 3rd group of children with TMJ after complex therapy. Thus, the MMR-1 index decreased 2.3 times after treatment, MMR-9 – by 37% and MMR-3 – by 4.8 times compared with the group of children before TMJ treatment. A different dynamics was noted relative to the dynamics of TIMP-1 in the study group of children after complex therapy, as its level increased by 27%, indicating an increase in the activity of the tissue metalloprotease inhibitor. According to the results obtained, the complex therapy of children with TMJ, depending on age, has a peculiar dynamics of metalloproteases and inhibitors [12]. The angles of occlusal transversal curves were 9.0° and higher in 100% of cases in the area of the second molar in the main group[13]. Pathological joint changes in the diagnosis and treatment of malocclusion and functional disorders of the TMJ in children were detected early using orthopantomograms and 3D X-ray examination, there was a displacement of the head in the orthognathic bite by 20%, in the distal bite by 71.4%, in the deep bite by 73.3% and in the mesial bite by 33.3%. The possibility of increasing the effectiveness of treatment by 82% by accurately assessing the social and mental stability of children with diseases of the temporomandibular joints caused by anomalies and deformations of the maxillary system is substantiated[14] . According to the results of the study, the high effectiveness of the combined use of Wobenzyme and Omega 3-6-9 as a general treatment simultaneously with orthodontic procedures is substantiated., what is the effectiveness of traditional orthodontic treatment in the treatment of anomalies and deformities of the maxillary system in children? By determining the activity of metalloproteinases and connective tissue markers in the blood serum of children, the occurrence and formation of pathological processes in the temporomandibular joint made it possible to predict pathology at an early stage and thus proved the possibility of creating the basis for an effective treatment outcome.

Conclusion

The study explores the processes of bone remodeling in the context of temporomandibular joint (TMJ) pathologies in children and adolescents, emphasizing their impact on mineral homeostasis and structural adaptation. The research aims to develop an effective diagnostic and comprehensive treatment approach for pediatric TMJ disorders. A clinical and dental examination was conducted on 300 children (130 boys and 170 girls), among whom 145 had TMJ pathologies (main group) and 155 were healthy controls. The study included a comparative analysis of clinical and biochemical data, integrating orthodontic and general treatment over 9 to 16 months. Diagnostic procedures involved clinical, biometric, and radiographic assessments. Results indicated significant oxidative stress and microbial contamination in TMJ-affected adolescents, along with a genetic predisposition to connective tissue dysplasia. Biochemical markers, including matrix metalloproteinases (MMP-1, MMP-3, and MMP-9), demonstrated substantial reductions post-treatment, while tissue inhibitor of metalloproteinases (TIMP-1) levels increased, indicating improved collagen integrity. Orthodontic evaluation revealed occlusal curve alterations and joint displacement patterns, further corroborating TMJ dysfunction.

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