Evaluation of the effectiveness of a complex method of treatment in children and adolescents with pathologies of the temporomandibular system

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ABSTRACT

In order to select the study group of patients, a clinical and dental examination was conducted among 300 children and young men (130 boys (43.33%) and 170 girls (56.66)) of which 145 with TMJ pathologies (the main group - MG) and 155 examined absolutely no pathologies of the TMJ (control group - CG) of students of secondary schools and colleges who were registered with the dispensary and applied for treatment to a specialist dentist in the Department of Orthopedic Dentistry of the Bukhara State Medical Institute and the regional children's and adult dental clinic in Bukhara. The prevalence of dental anomalies and deformities in children was 57.5%, of which 36.4% were malocclusions. As a result of dental anomalies and deformities in 16.1% of cases, the occurrence of TMJ dysfunction in children was revealed. The possibility of assessing the development of normal or pathological processes in children using anthropometric measurements of the face was revealed. In cases of temporomandibular joint pathologies caused by anomalies and deformities of the dentoalveolar system, the highest rate of increase in the physiological height of the face was found in boys and girls aged 14-18 years, the lowest rate-at the age of 6-9 years. 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.

Keywords: treatment, children, adolescents, temporomandibular system.

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INTRODUCTION

Pathologies of bone tissue – a variety of pathological conditions in origin, expressed in a violation of the bone structure. An integral indicator of the metabolic activity of bone tissue is the processes of active restructuring and renewal of bone structures that continue throughout life. These processes, on the one hand, are an important mechanism for maintaining mineral homeostasis, and on the other hand, they provide structural adaptation of the bone to changing functional conditions. The process of bone tissue remodeling is a mechanism aimed at maintaining homeostasis, which is highly sensitive to various regulatory and controlling mechanisms, as well as to endo- and exogenous influences. These processes are determined by the influence of many factors, a feature of the pathogenesis of changes in bone mineral density in children are genetic defects in the development of both components of bone tissue and the control system for its remodeling processes.

The study of candidate genes is currently mainly focused on genes that regulate bone metabolism, such as cytokines and growth factors, matrix proteins and calciotropic hormones. It has also been proven that matrix metalloproteinase (MMPs) play a special role in the development and maintenance of chronic inflammation - these are Zn2+ and Ca2+-dependent endopeptidases, catabolism enzymes of most extracellular matrix proteins at various stages of the inflammatory

process. MMPs, along with other extracellular proteinases, are able to carry out processes such as coagulation, immune response, physiological tissue remodeling, and they are secreted from neutrophils, fibroblasts, epitheliocytes, macrophages, endothelial vascular smooth muscle cells, and osteoblasts [H. Eba, Y. Murasawa, K. Iohara, Z. Isogai, 2012].

Recently, there is often scientific evidence that MMP8 and MMP9 are a marker of both the severity and activity of the pathological condition. It seems interesting to conduct further studies of the levels of other markers, both in saliva and in the blood - MMPs and their tissue inhibitors, as well as to scientifically substantiate the use of the data obtained to assess the severity, clinical course and effectiveness of therapy for the pathology of the dentoalveolar system.

In dental practice, you can meet patients with pathology of the temporomandibular joint (TMJ) suffering from pain, hypermobility in the joint, dislocations and subluxations of the meniscus, disorders in chewing food, difficulties in communicative communication with other people, at the same time, dental practice is difficult in the diagnosis and treatment of the cause of TMJ dysfunction.

All of the above confirms the need for further study of the characteristics of the clinical manifestations of TMJ pathology in adolescents, the search for new approaches to diagnosis and treatment.

Purpose of the study. To determine the approach to effective diagnostics and complex method of treatment in children and adolescents with TMJ pathologies.

MATERIALS AND METHODS

In order to select the study group of patients, a clinical and dental examination was conducted among 300 children and young men (130 boys (43.33%) and 170 girls (56.66)) of which 145 with TMJ pathologies (the main group - MG) and 155 examined absolutely no pathologies of the TMJ (control group - CG) of students of secondary schools and colleges who were registered with the dispensary and applied for treatment to a specialist dentist in the Department of Orthopedic Dentistry of the Bukhara State Medical Institute and the regional children's and adult dental clinic in Bukhara (table No. 1).

Table №1.

Group of surveyed children by gender and age, n=300

Age number		of Total		Girls		Boys	
		number	in % - ah	number	in % - ah	number	in % -ah
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%

14-18 133/44. 3%	**Exhaust**	68	22.66%	41	13.66%	27	9.0%
	KG	65	21.66%	40	13.33%	25	8.33%
Total 300/100%	**EXHAUST**	**145**	**48.33%**	**84**	**28%**	**61**	**20.33%**
	KG	**155**	**51.66%**	**86**	**28.66%**	**69**	**23%**

In order to compare the clinical, biochemical results, the complex method of treatment we are carrying out was chosen from the main group of 6-9-year-old 20 children (Group 1), 10-13-year-old 35 children (Group 2) and 14-18-year-old 48 adolescents (Group 3). a) who received specialist care and general treatment for 9 to 16 months were under the supervision of an orthodontist; they served as a control group of 15 children and adolescents from the practical healthy group (CG).

The diagnosis was established based on anamnesis of clinical, biometric, X-ray examination of patients and in accordance with the criteria for making a diagnosis: At the first stage of the diagnostic process, information received directly from the patient was collected and analyzed, his subjective opinion was listened to about how the disease began and how the disease developed; on the second stage, objective symptoms were established, a detailed examination of the patient was carried out. In order to increase the efficiency of diagnosis and treatment, a unified coding card for clinical examination was developed, which includes a list of signs of TMJ pathology (S.A. Gafforov's manual).

Particular emphasis was placed on characteristic features in the analysis of morphological and functional changes leading to the formation of an intermediate space in the frontal area between the lower and upper dentition, as well as the height of its lower part. According to the indications, in order to characterize the AFA in children and adolescents, the following were used: - biometric; - photometric, - teleroentgenogrammetric; - orthopantomogrammetric studies; - statistical analysis of the results, as well as the examined were divided into groups according to the type of occlusion in accordance with the classification of L.S. Persin.

A total of 103 children and adolescents with TMJ pathologies were used for local orthodontic treatment according to orthodontic indications; springs, screws, archwires, myofunctional trainers and Edgewise system braces for 3 to 12 months; of which 58 children and adolescents underwent general treatment in parallel (complex treatment group) in order to correct metalloproteinases and connective tissue markers in the body of children.

The results of the biochemical method of research in 103 children and adolescents with TMJ pathologies (of which 48 adolescents with formed pathologies of TMJ dysfunction (group 3)), venous blood and saliva were collected from children in the morning on an empty stomach. For biochemical studies, venous blood was collected from children in the morning on an empty stomach. The counting of blood cells was carried out on a hematological analyzer SysmexKX-21 in capillary blood taken with EDTA. The content of C-reactive protein and parameters of endogenous intoxication in the blood (creatinine, urea, bilirubin, seromucoid, sialic acids, antistreptolysin-0) were studied on a Cobas-411 biochemical analyzer by ROSH (Switzerland).

For all quantitative data, the group arithmetic mean (M) and standard error of the mean (m) were calculated, which are presented in the summary tables. Statistical analysis was carried out using the program Statistica ver. 7.0. Differences were considered significant at P<0.05.

RESULTS AND DISCUSSION

Table №2.

Occurrence of bite forms in the surveyed children and young men from 6 to 18 years.

Age / Bite	KG=155 healthy children and young men Total 24 physiol. occlusion -15.5%						OG=145 children and young men with TMJ pathologies. A total of 145 patol. bite -100%					
	6-9 years; n= 42		10-13 years, n= 48		14-18 years, n= 65		6-9 years, n= 25		10-13 years, n= 52		14-18 years, n= 68	
	Number	%	number	%	number	%	number	%	Number	%	number	%
Distally	-	0	-	0	-	0	3	12,0	3	5,7	1	1,4
Reverse	-	0	1	0,2	1	0,15	3	12,0	4	7,7	6	8,8
Discoveries	-	0	-	0	-	0	3	12,0	3	5,7	8	11,8
Deep	-	0	2	0,42	3	0,46	2	8,0	4	7,7	6	8,8
Bobrovnitskii	1	0,24	3	0,62	-	-	1	4,0	1	1,9	3	4,4
Protrusion	-	0	-	0	-	0	2	8,0	5	9,6	5	7,3
Skusenosti n/a h	1	0,24	2	0,42	3	0,46	2	8,0	6	11,5	8	11,8
Skusenosti /h	-	0	2	0,42	2	0,3	3	12,0	8	15,4	9	13,2
Cross	-	0	-	0	2	0,3	1	4,0	2	3,8	5	7,3
Medial	-	0	-	0	1	0,15	5	20,0	16	30,7	17	25,0
Just	2	0,48	10	of 2.08	12	of 1.84	25	100	52	100	68	100

Table №3.

Occurrence of dentition defects in the examined children and young men aged from 6 to 18 years.

Age	155 healthy children and young	men 145 children and young men with TMJ pathologies

Bite	**155 children**	**6-9 years old; n= 42**		**10-13 years old n= 48**		**14-18 years old n= 65**		145 children	**6-9 years old n= 25**		**10-13 years old n= 52**		**14-18 years old; n= 68**	
		Qty	%		%		%			%		%		%
Dystopia	--	-	0-0-0	-	0	-	0	7/4,8	4	16,0	3	5,8	-	0
Infra	- occlusion 4/2,6	1	2,4	1	2,1	2	3,1	88/60,7	12	4,8	20	38,5	56	82,3
Diastema	5/3,2	1	2,4	2	4,2	2	3,1	15/10,3	1	4,0	8	15,4	6	8,8
Supraocclusion	6/3,9-0	-	0	4	8.33	2	3.1	8/5,5	1	4,0	7	15,5	-	0
Total	**15/9,7%**	**2**	**4,8**	**7**	**14,6**	**6**	**9,23**	**118/81,37%**	**18**	**72,0**	**38**	**73,1**	**62**	**91,2**

Matrix metalloproteinase types 1 and 9 (MMP-1 and MMP-9), which play a central role in the metabolism of connective tissue proteins and are specific markers of collagen breakdown, were studied in the blood serum of 48 examined adolescents with TMJ (Table 4). Attention was drawn to a significant increase in the content of MMP-1 in adolescents with TMJ as the main enzyme that denatures the fibrillary collagen of the extracellular matrix. Similar changes were revealed in the study of the content of MMP-9, the concentration of which in adolescents of the 1-group (OG) was 1.6 times higher than in children of the comparative group (SG), which, according to N.I. Solovieva and O.S. Ryzhakova (2010), may indicate an activation of type IV collagen hydrolysis. The concentration of TIMP-1 in cases of TMJ decreased when compared with the control group of children. The increased coefficients MMP-1/T1MP-1 and MMP-9/TIMP-1 confirm the possibility that the rate of collagen degradation by matrix proteinases exceeds the rate of its synthesis.

Table №4.

Comparative characteristics of the content of matrix metalloproteinases in blood serum in adolescents with TMJ, M±m

Index	of the Survey Group	
	Adolescents with TMJ, n=48 (group 3)	**Healthy children (comparative) n=15**
MMP-9, ng/ ml	118.17±8.63*	73.97±5.19
MMP-1, ng/ml	11.11±1.08*	4.37±0.53
MMP-3, ng/ ml	38.04±3.14*	7.72±0.61
TIMP-1, ng/ml	598.62±18.91	728.32±19.13
MMR-1/T1MR-1, conl. units	0.003	0.002
MMR-9/T1MR-1, conl. units	1.33*	0.54

Note: * - significance of differences P <0.05 in relation to control data

Based on the analysis of the results, it can be said that the established differences in the number, distribution and localization of collagen and elastic fibers, along with a violation of the expression of protein-coding genes, in particular, the MMP and TIMP families, determine the multilevel changes in the HR microarchitectonics of adolescents with TMJ pathology.

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 saliva pH and a decrease in the level of cellular metabolism. When assessing the genealogical history in this group, burdened heredity was noted not only for diseases of the gastrointestinal tract (80.8%), but also for diseases that form against the background of undifferentiated connective tissue dysplasia (NDST), namely varicose veins of the lower extremities (V. V. Chemodanova (2010)) about the important role of NDST in the development of chronic pathology in children. Therefore, the clinical and anamnestic markers identified at the first stage allow us to speak with a high degree of probability about the presence of genetically determined DMTD in adolescents with TMJ pathology.

Using laboratory research methods, we studied the biochemical parameters that characterize the state of homeostasis and the level of nonspecific resistance in PR in adolescents with TMJ pathologies (Table 5). According to the table, catalase activity in group 3 in the primary clinical and laboratory study was on average 2 times lower than in children with hypertension. This indicates the depletion of the reserve capacity of the antioxidant system in adolescents in group 3. Considering that in the genesis of TMJ pathology in children, great importance is attached to membranopathological processes at the level of cellular factors, and the important mechanism leading to destabilization of cell membranes is the process of lipid peroxidation (LPO), the level малонового of malondialdehyde (MDA) in the oral fluid was studied (Table 5).

The obtained research results showed that in children of group 3, the MDA content was significantly higher than in practically healthy children. This indicated a local "in the oral cavity" intensification of lipid peroxidation processes in children with TMJ pathologies. The results of a study of the degree of inflammatory processes in the PR, the intensity of which characterizes the activity of the leukocyte proteolytic enzyme elastase in the RV.

Table№ 5.

Biochemical parameters of RJ in the examined patients (mcat/l, mc-cat/l and u/ ml, mc-cat/l)

Parameters	Adolescents with TMJ	Healthy children

	pathologies n=48	**(compare) n=15**
Catalase activity	activity 0.122±0.021*	0.324±0.024
Malonic dialdehyde	0.305±0.032*	0.129±0.016
Elastase activity	2.97±0.16*	1.72±0.14
Lysozyme activity	activity 0.025±0.004*	0.093±0.008
Urease activity	activity 0.417±0.034*	0.096±0.011

Note: * - significance of differences P <0.05 when compared with the control

Biochemical analysis of oral fluid in children with TMJ disease showed an increase in the activity of elastase in the oral fluid. In adolescents of group 3, the activity of lysozyme in the RJ was 2.4-3 times less than in children of SG. Urease activity in the prostate gland in group 3 was on average 2 times higher than in the comparison group (P<0.05). A decrease in catalase activity and a high content of MDA in the RJ in children of group 3 indicated a violation of the reserve capabilities of the antioxidant system and an intensification of lipid peroxidation processes in the PR.

It is known that the systemic metabolism of connective tissue in patients with TMJ pathologies is characterized by the release of glycoproteins, a decrease in sulfated GAGS. In addition, they determine the rheological properties of blood, which explains the occurrence of typical hemostatic disorders in PFA, which affects thrombophilia caused by a systemic inflammatory response, which explains the predominance of GAG destruction over their synthesis (Table 6).

As can be seen, adolescents with TMJ pathologies showed a significant increase in the level of glycosaminoglycan (GAG) in the blood serum by an average of 2.2 times when comparing children with SG.

Table № 6.

Dynamics of GAG, C-RB, and ESR parameters with TMJ pathologies

Groups	**Serum GAG level, mmol/ l**	**Erythrocyte sedimentation rate mm / h**	**S-RB highly sensitive, ng/ ml**
With TMJ pathologies n=48	24,65±21,5*	16,34 ±3,51*	35,39±4,42*
Healthy children n=15	41,15±1,79	7,08±0,53	9,73±0,18

Note: * - significance of differences P <0.05 when compared with the control.

The obtained research results indicate that degenerative processes in the connective tissue substance are associated with a violation of the structure or function of GAGS and their involvement in the pathological process. In addition, the dynamics of HAPH in the blood serum of the examined children indicates its high specificity, which indicates cartilage damage and indicates the development of connective tissue dysplasia.

As mentioned above, TMJ pathology causes changes at the level of a number of enzymes belonging to the MMP family. This is expressed in the detection of an increase in the concentration of MMP in the saliva and blood serum of patients with TMJ diseases. The choice of MMP-1 which is an interstitial collagenase, and MMP-9, which acts on basal membrane collagens, in our study was

made taking into account the fact that the extracellular matrix and basal-membrane have a different structure and composition, and TIMP-1 is able to inhibit both of these proteinases. In addition, matrix metalloproteinases of types 1 and 9 (MMP-1 and MMP-9) play a central role in the exchange of connective tissue proteins and are specific markers of collagen breakdown.

Traditional treatment of children with anomalies and deformities of the maxillary system and pathologies of the temporomandibular joint was carried out only with orthodontic devices. Based on the preliminary results of the study, a comprehensive treatment method with therapeutic and diagnostic measures was developed and put into practice. Based on this, the drugs used in the study, namely, in the treatment method, Wobenzym and Omega 3-6-9 were used as general treatment, as well as orthodontic treatment as local treatment (Figure 1).

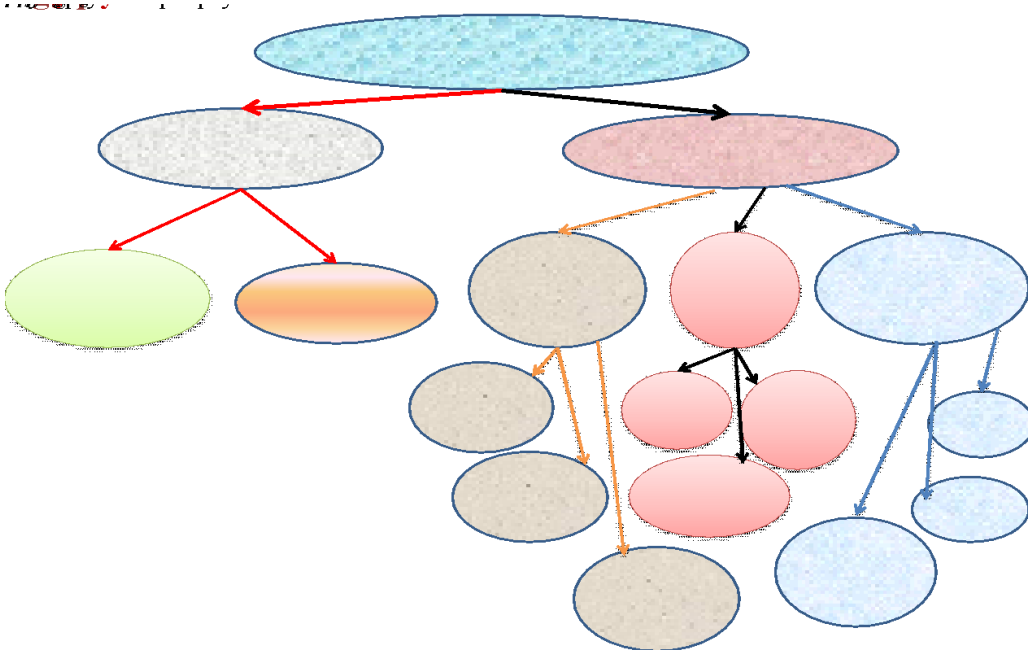
The study revealed a significant decrease in the amount of matrix metalloproteinase MMP-1 as the main enzyme that performs denaturation of extracellular matrix fibrillar collagen in children of group 1 on the background of complex therapy, on average by 44%.

The studied indicator on the background of complex therapy decreased by 24% compared to the group of children before treatment of the underlying disease. The study showed a decrease in the concentration of matrix metalloproteinase (MMP-3) in the group of children examined on the background of complex therapy. However, the matrix metalloproteinase index (MMP-3) tended to decrease by an average of 2.5 times compared to the group of children before treatment.

In the course of the study, attention was drawn to a significant decrease in the content of MMP-1 as the main enzyme that performs denaturation of extracellular matrix fibrillary collagen in children of group 1 on the background of complex therapy, on average by 44%.

Similar changes were found in the study of the content of MMP-9, the concentration of which in children before treatment was 1.6 times higher than in healthy children, which, according to N. I. Solovyova and O. S. Ryzhakova (2010), may indicate an activation of hydrolysis of type IV collagen. On the background of complex therapy, the studied indicator decreased by 24% relative to the group of children before treatment of the underlying disease.

Figure 1. Algorithm of complex treatment of children with TMJ pathologies caused by anomalies and deformities of the maxillary system.



In our studies, there was a significant increase in MMP-3 in children with TMJ pathologies, when compared with healthy children. Meanwhile, against the background of complex therapy, a decrease in the concentration of MMP-3 was observed in the examined children. 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.

Table №7.

Dynamics of matrix metalloproteinases and its inhibitor in blood serum in children and adolescents with TMJ pathologies before and after therapy

Groups		MMP-1 ng/ ml	MMP-9, ng/ ml	MMP-3, ng/ml	TIMP-1 pg/ ml
Healthy children n=15		4,37±0,53	73,97±5,19	7,72±0,61	728,3±19,1
Children with TMJ n=103		11,11±1,08	118,17±8,63	38,04±3,14	598,6±18.9
I-group; 6-9 years old n=20	**Trad. lech.n=10**	10,02±1,12	111,78±9,01	32,67±3,54	612,0±14,7
	Comp. lech.n=10	6,23±0,47*	90,24±7,58	15,07±0,61*	659,3±20,1
II-Group II; 10-13years old n=35	**Trad. lech.n=15**	8,04±0,64*	94,23±7,48	21,56±2,45*	654,1±15,1
	Comp. lech.n=20	5,68±0,47*	76,12±5,56*	9,57±0,81*	716,5±16,1
III-Group III; 14-18years old n=48	**Trad. lech.n=20**	5.89±0,46*	81,54±7,43	11,27±0,97*	712,1±14,5
	Comp. lech.n=28	4,78±0,33*	75,12±6,04*	8,04±0,72*	763,5±19,5

Note: * - significance of differences P <0.05 when comparing groups before and after treatment

In our study, children of the compared groups showed a low level of TIMR-1, in the control

group. The established differences in the number, distribution, and localization of collagen and elastic fibers, along with a violation of the expression of protein-coding genes, in particular, the MMP and TIMP families in group 1 of children on the background of complex therapy, indicate an increase in the level of TIMP-1 by an average of 10%.

Analysis of the results of group 2 children showed more pronounced changes in the studied parameters; MMP-1 after complex therapy had a similar dynamic as in group 1 children, i.e. it decreased by an average of 48% during therapy when compared with the group of children before treatment. A decrease in the content of MMP-1 in children of group 2 on the background of complex therapy indicated a decrease in the expression of MMP-1, which performs denaturation of fibrillar collagen of the extracellular matrix. 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 in relation to MMP-3, where its concentration in children of group 2 after complex therapy decreased by an average of 4 times. As is known, the natural antagonist of MMP-1 is TIMP-1. Analysis of the results obtained in 2 groups of children after treatment showed an increase in the level of TIMP-1 by an average of 20% when compared with the initial values.

Analysis of the results obtained regarding the dynamics of the studied parameters 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 dynamics of decrease by an average of 2.3 times compared to the group before treatment. A similar dynamic was observed in relation to the dynamics of MMP-9, where its content in the blood decreased 1.6 times when a group of children compared TMJ before treatment. More pronounced changes in the activity of metalloproteases-3 were observed in group 3 of children with TMJ after complex therapy. Thus, the MMP-1 index after treatment decreased by 2.3 times, MMP-9 – by 37% and MMP-3 – by 4.8 times when compared with the group of children before TMJ treatment. A different dynamics was observed relative to the dynamics of TIMP-1 in the study group of children after complex therapy, since its level increased by 27%, thereby indicating an increase in the activity of the tissue metalloprotease inhibitor. According to the results obtained, complex therapy of children with TMJ, depending on age, has a peculiar dynamic of metalloproteases and inhibitor.

Analysis of the obtained results of the studies presented in Table No. 8 showed an increase in all the studied parameters in the blood of children with TMJ. In this situation, complex therapy was accompanied by an increase in the level of serum GAG in the blood of children of group 1 by an average of 30% when compared with the indicators of the group of children before TMJ treatment. In group 2 of children with TMJ, there was also a 2.5-fold increase in the level of GAG in the blood serum when compared with the group of children before treatment.

Table №8.

Dynamics of GAG, C-RB and ESR parameters in children with TMJ disease before and after therapy

Groups	Serum GAG level, mmol/ l	Erythrocyte sedimentation rate, mm / h	S-reactive protein ng/ ml
Healthy children n=15	41,15±1,79	7,08±0,53	9,73±0,18

Children with TMJ n=103		24,65±2,15	16,34 ±3,51	35,39±4,42
I-group; 6-9 years old n=20	**Trad. lech.**	29.13±3.27	14.01 ±3.28	28.45±2.12
	Comp.lech.	49,65±4,01*	10,04±1,08*	16,32±1,14*
II-group; 10-13years old n=35	**Trad. lech.**	34.78±3.14	11.23 ±1.07	19.78±1.83
	Comp.lech.	61,46±2,78*	8,79±0,83*	11,03±0,98*
III-Group III; 14-18years old n=48	**Trad. lech.**	38.03±2.12	9.67 ±1.13	14.46±1.13
	Comp.lech.	77,08±5,13*	7,56±0,61*	10,04±0,87*

Note: * - significance of differences P <0.05 when comparing groups before and after treatment

Similar dynamics was observed in adolescents of group 3, where the studied indicator exceeded the initial level by 3.1 times of pretreatment SG. Apparently, an increase in the level of GAG in the blood of adolescents with TMJ pathologies after complex therapy indicates the restoration of connective tissue in the CSF, which was expressed in adolescents of 3 groups (an increase of 300%).

Analysis of the results of studies on ESR in children with TMJ after complex therapy showed a decrease in the ESR level in all groups of the studied individuals. A significant decrease in the latter was observed in group 3 adolescents, which, in our opinion, is due to an increase in the level of GAG, which as a polyamine adsorbs endogenous toxins in the blood. As mentioned above, high concentrations of C-RB in the examined children with TMJ indicate the role of inflammation in damage to the connective tissue of the TMJ. As the results of studies show, complex therapy in group 3 was accompanied by a decrease in the level of C-reactive protein in the blood, the severity of which was noted in group 3.

CONCLUSION

The prevalence of dental anomalies and deformities in children was 57.5%, of which 36.4% were malocclusions. As a result of dental anomalies and deformities in 16.1% of cases, the occurrence of TMJ dysfunction in children was revealed. The possibility of assessing the development of normal or pathological processes in children using anthropometric measurements of the face was revealed. In cases of temporomandibular joint pathologies caused by anomalies and deformities of the dentoalveolar system, the highest rate of increase in the physiological height of the face was found in boys and girls aged 14-18 years, the lowest rate-at the age of 6-9 years. 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. Pathological changes of the joint in the diagnosis and treatment of abnormal occlusion and functional disorders of the TMJ in children were detected early using orthopantomograms and 3D X-ray examination, head displacement was observed in orthognathic occlusion by 20%, in distal occlusion by 71.4%, in deep occlusion by 73.3% and in mesial occlusion by 33.3%.The possibility of increasing the effectiveness of treatment by 82% by accurately assessing the social and mental stability of children with pathologies of the temporomandibular joints caused by anomalies and deformities of the dentoalveolar systemis substantiated. According to the results of the study, the combined use of Wobenzyme and Omega 3-6-9 as a general treatment

simultaneously with orthodontic procedures is more effective than 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 the early stage and this proved the possibility of creating a basis for an effective treatment result.

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