

Clinical-Functional, Biochemical Characteristics, And Improvement Of Methods Of Treatment Of Dentoalveolar Anomalies In Children And Adolescents With Bronchial Asthma

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Abstract – We studied the dental condition of the oral cavity of children and adolescents with dentoalveolar anomalies against the background of bronchial asthma in 225 patients; of them 180 with dentoalveolar anomalies and deformities suffering from bronchial asthma, and 45 patients without somatic pathology in the age categories 6-9 years old, 10-13 years old and 14-18 years old. In the course of clinical research, the state of hard tissues of the tooth, periodontal tissues and oral mucosa, biochemical composition of the oral fluid, morphological parameters of the maxillofacial region, as well as the frequency of dentoalveolar anomalies and deformities were studied. An effective combined method of treatment with the place of morphofunctional effectiveness of removable and non-removable orthodontic appliances, the manufacture of various plastic materials for the treatment of the oral cavity and orthodontic appliances using phytotherapeutic drugs, as well as general treatment for somatic pathologies have been proposed and evaluated.

Keywords – children and adolescents, oral cavity (OC), bronchial asthma (BA), dentoalveolar anomalies and deformities (DAA and DAD), diagnosis, treatment, prevention, composition of the oral fluid, herbal medicine in dentistry.

I. RELEVANCE

Currently, all over the world, including Uzbekistan, there is an unfavorable tendency towards an increase in the level of DAA and DAD in children and adolescents due to an increase in the frequency of diseases of background pathology, such as the respiratory system, allergic pathology, gastrointestinal, endocrine, and cardiovascular diseases [3, 13, 15, 17,]. Nevertheless, it should be noted that the frequency of dentoalveolar anomalies significantly increases (from 43,4 to 73,6%) in persons with other dental diseases, such as caries, periodontal disease [12, 11], as well as the trend in the population of pathology in different age periods, with a significant increase in the frequency of DAA in both children and adults over the past 15-20 years [16, 9].

When studying the frequency of DAA in children with different levels of health, scientists identify etiopathogenetic relationships between various diseases of the body and the formation of pathological disorders in the dentoalveolar system (hereinafter referred to as DAS) [8, 11, 13, 14]. in DAS in children and adolescents with pathological changes in the body allows us to consider DAA as a socially significant combined pathology [3, 4, 7, 10]. In addition to the above, it was determined that the

level of oral hygiene in children with allergic pathology is significantly lower than in healthy children, this is due to the unsatisfactory hygienic state of OC [1]. We also know that for the treatment of BA with the use of inhaled drugs, the pH of which has a level of less than 5,5, the pH of dental plaque decreases, this, together with a decrease in the rate of salivation, a decrease in the content of amylase and Ig A in saliva, adversely affects the dental level. health of children with BA [18]. The study of the dental status and immunoregulatory mechanisms in children with BA demonstrated a high degree of prevalence and intensity of the carious process in combination with lesions of the oral mucosa (hereinafter referred to as the OM), and at the same time, pronounced changes in the salivary cytokine spectrum were determined: increased levels of cytokines: interleukin-4 (IL-4), interferon- γ (IFN- γ), interleukin-6 (IL-6); it was also found that in children with BA who take inhaled glucocorticoids, the state of hard tissues of teeth, periodontal tissue and the mineralizing function of saliva are disturbed, as a result, children with BA are at risk of developing caries, non-carious lesions, periodontal tissue diseases, and candidal stomatitis [19]. However, an analysis of the literature data showed that the state of DAS in children with BA, a disease that is one of the central problems of dentistry and pediatrics, has not been sufficiently studied. An in-depth analysis of the dependence of the frequency and structure of DAA in children and adolescents with BA on the age period of DAS, duration and severity of the underlying disease is required. This means to concretize the prevalence of clinical forms of DAA and DAD in this category, including a multifactorial assessment of epidemiological parameters; as morphometric, clinical and functionally characterizing dental statuses in children with BA and DAA.

II. PURPOSE OF THE STUDY

The aim of this study is to study the pathology of the OC and DAS organs in children and adolescents with DAA and DAD with BA, as well as to improve the combined treatment methods by correcting adaptive-compensatory reactions at the local and systemic levels.

III. MATERIALS AND RESEARCH METHODS

To determine the dental status in children and adolescents with BA, a comprehensive clinical examination was carried out in 180 patients aged 6 to 18 years; by age group - 6-9 years old; 10-13 years old and 14-18 years old; also, for further continuation of the research stages to determine the morphofunctional effectiveness of local treatment with removable orthodontic (Main group (MG) -1; Control group (CG) -1) and fixed (MG-2; CG-2) devices (25 patients from MG-1, and MG-2; 10 patients CG-1; CG-2), a study of the hygienic state and biochemical composition of the oral fluid of children and adolescents was carried out, divided into two groups regardless of gender and age (table №1).

Table № 1. Distribution of examined children and adolescents by age, sex and type of orthodontic apparatus (M + m)

Number of children and adolescents in groups												
Age	Main group				Total		Control group				Total	
	boys		girls				boys		girls			
	sur.	%	sur.	%	sur.	%	sur.	%	sur.	%	sur.	%
Removable orthodontic appliances												
6-9	22	24,4	6	6,7	28	31,1	3	15,8	2	10,5	5	26,3
10-13	27	30,3	16	17,7	43	47,8	3	15,8	3	15,8	6	31,6
14-18	11	12,2	8	8,9	19	21,1	4	21,0	4	21,0	8	42,1
Total	60	66,7	30	33,3	90	100	10	52,6	9	47,4	19	100
Fixed orthodontic appliances												
6-9	10	11,1	9	10,0	19	21,1	4	15,4	2	7,7	6	23,1
10-13	18	20,0	12	13,3	30	33,3	4	15,4	2	7,7	6	23,1
14-18	24	26,7	17	18,9	41	45,5	7	26,7	7	26,7	14	53,4

Total	52	57,8	38	42,2	90	100	15	57,7	11	42,3	26	100
Total sur. 225/ 100%	112	62,2	68	37,8	180	100	25	56,2	20	44,6	45	100

In the process, the state of hard tissues of the tooth, periodontal tissues and oral mucosa, morphometric parameters of the temporofacial bone, as well as the frequency of dentoalveolar anomalies and dentoalveolar deformities and the level of oral hygiene were studied. The examination was carried out on the basis of the Department of Dentistry, Pediatric Dentistry and Orthodontics, Center for the Development of Professional Qualifications of Medical Workers of the Ministry of Health of the Republic of Uzbekistan, 45 children and adolescents with dentoalveolar anomalies and dentoalveolar deformities without somatic pathology served in the control group.

When collecting anamnesis, the level of control of bronchial asthma was assessed using Asthma Control Test (ACT) for children from 4 to 11 years old and according to medical documentation. During an external examination, the height, physical development, physique, posture were assessed, the proportionality, symmetry of the face, the type of profile, the presence of facial signs of dentoalveolar anomalies were determined. During the intraoral examination, the nature of attachment of the frenulum of the lips and tongue, the depth of the vestibule of the mouth, the state of the hard tissues of the tooth, periodontal tissues, and the state of the mucous membrane of the oral cavity were assessed. Anomalies of the position of individual teeth, anomalies of dental arches, anomalies of bite in the sagittal, vertical and transversal directions were diagnosed. The functions of breathing, swallowing, speech, and the temporomandibular joint were assessed. Clinical functional tests of Eshler-Bitner and Ilyina-Markosyan were carried out, in addition, they additionally investigated: anthropometric measurement of diagnostic models of the jaws, orthopantomography, telerradiography and diagnosed in accordance with the classification of occlusion anomalies of the dentition and jaws.

In clinical studies, indices for assessing the state of hard tissues of teeth were used The total of teeth affected by caries and filled, the total of surfaces affected by caries and filled, carious, filled and extracted teeth, surfaces with carious formations + filled, indices of the state of periodontal tissues - papillary-marginal-marginal % index, bleeding, Schiller-Pisarev test (Sh-P), CPITN and the level of oral hygiene - Silness-Loe, Stallard. To assess the functional state of the organs and tissues of the oral cavity and the dentoalveolar system, hygienic indices were determined; periodontal indices; pH - oral fluid; diagnostic models studied; orthopantomogram images were analyzed; biochemical research; the charge state of buccal epithelial cells was assessed in children and adolescents.

In order to determine the morphometric parameter of the head of children and adolescents, the girth (circumference) of the head (CH), length of the head (longitudinal diameter of the head - LDH), width of the head (transverse size of the head - TSH), vertical or height diameters of the head (VDH or HDH), transverse size forehead (TSF), as well as to determine the size of the base of the head (skull), the length of the base of the head and the width of the base of the head (skull) were measured with a pelvimeter. The morphometric characteristics of the parameters of the face of the studied children were carried out according to 7 indicators: zygomatic diameter, mandibular (m / b) diameter, angle of the child's mandible, morphological height of the face (MHF), physiognomic height of the face (FHF), externally orbital width and interorbital width.

In the process of work in the oral fluid (OF) of the examined children and adolescents, the following were assessed: the content of malondialdehyde (MDA), the activity of catalase, elastase, urease, lysozyme using a set of the firm "HUMAN"; and also assessed the level of functionality of the reaction in the oral cavity by fluctuations in the pH value of the oral fluid and the assessment of the charge state of the cells of the buccal epithelium.

Statistical processing of the results was carried out on the basis of the principles of variation statistics according to Student's criteria using the computer statistical programs Statistica 8.0.

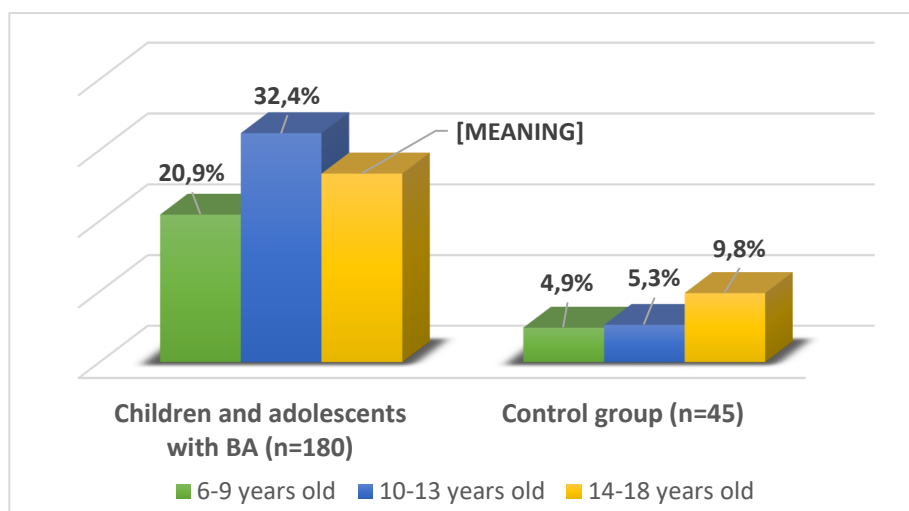
Thus, in the presence of statistically proven prerequisites for the use of parametric tests, the parametric Student's t-test was used to assess the difference in the arithmetic mean values of the samples. The decision was made based on the results of the nonparametric Mann-Whitney U-test.

IV. THE RESULTS OBTAINED AND THEIR DISCUSSION

It was found that the frequency of dentoalveolar anomalies in the early period of mixed bite (6-9 years) averaged 26,1%, in the period of late mixed bite (10-13 years) - 40,5%, in the final stage of bone tissue formation (14-18) - 33,3%. In the control group, 24,4%; 26,7%; 48,9% respectively with age groups.

Diagram 1 shows that in the structure of dentoalveolar anomalies in the examined main group (m/g) at the age of 6-9 years, teeth position anomalies (17,1%), edentulousness (17,1%), mesial occlusion (12, 8%); in the age group 10-13 years: adentia (12,3%), three (12,3%), diastema (12,3%), crowding of teeth (17,8%), narrowing of the jaws (13,7%), distal occlusion (12,3%); in the age group 14-18 years old - abnormal position of the teeth (16,7%), crowding of teeth (25%), narrowing of the jaws (21,7%), distal occlusion (20%), deep incisal disclusion (9,6%) ; in the control group (c/g) aged 10-13 and 14-18 years, there was an abnormal position of the teeth (13,6), adentia (16,7; 9,1), terms (16,7; 12,3), diastema teeth (18,2; 16,7); crowding of teeth (13,6%), which did not have somatic diseases, and the most frequently revealed anomalies in the position of individual teeth (48,9%).

Diagram № 1. The incidence of dentoalveolar anomalies and deformities in the age aspect in the examined group



When evaluating the data of clinical functional tests performed in the course of clinical examination in the main group, orofacial dysfunctions were revealed: dysfunctions of respiration, speech, swallowing (Diagrams № 2 and № 3); including, in children and adolescents of the main group, pathology was diagnosed with a higher frequency than in children and adolescents of the control group. The most common clinical signs of oral respiration were revealed: a symptom of "glossoptosis", dryness of the red border of the lips, a violation of lip closure. The infantile type of swallowing was detected in patients of the main group almost 2 times more often than in the control group; It was also noted that in patients of the main group in the period of early mixed bite, considered myofunctional problems were recorded 2,5 times more often than in the control group, in the period of late mixed bite - 4 times.

Diagram № 2. Functional disorders in the examined children and adolescents with dentoalveolar anomaly and dentoalveolar deformity in bronchial asthma (main group)

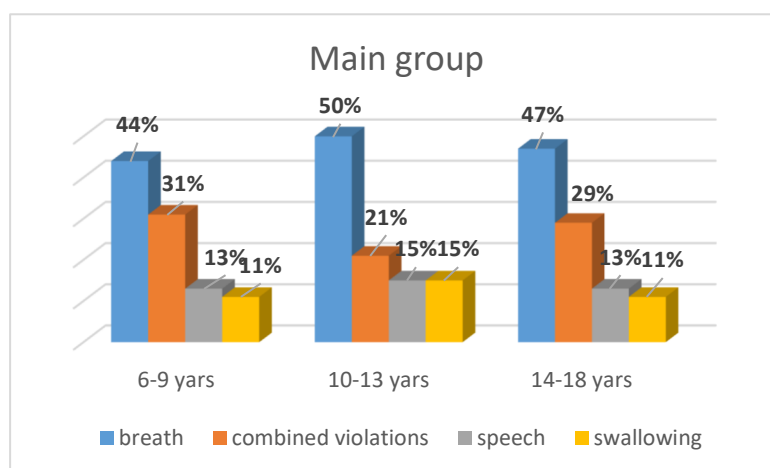
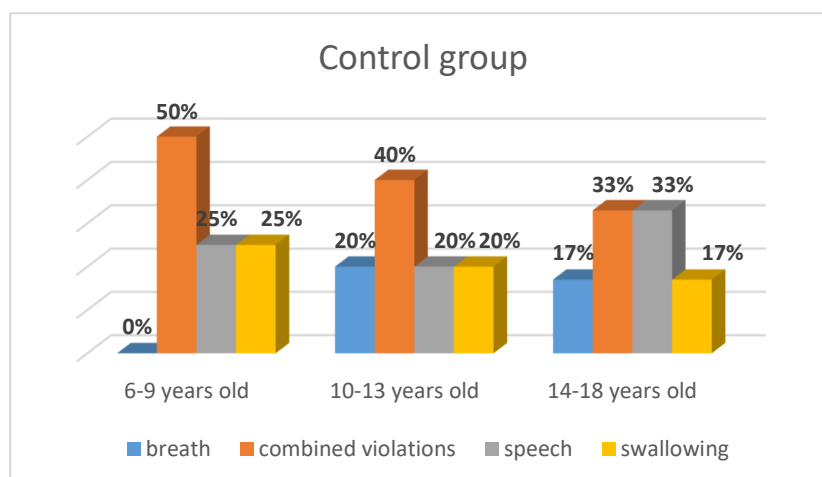


Diagram № 3. Functional disorders in the examined children and adolescents with dentoalveolar anomaly and dentoalveolar deformity in bronchial asthma (control group)



According to the results of the study, the prevalence of caries in patients in the period of mixed bite was 90,4%; in children and adolescents of the main group aged 6-9 years, the intensity of caries according to the index Sum of Teeth Affected by Caries and Sealed was $6,04 \pm 0,42$, Sum of Surfaces Affected by Caries and Sealed - $6,67 \pm 0,4$, Carious, Filled and Extracted Teeth - $2,98 \pm 0,2$, Surfaces with Carious Formations + Filled - $2,95 \pm 0,3$. Characteristically, in 15,8% of these children, chalk-like spots were diagnosed in the cervical region of the teeth, with the intensity of the lesion being $4,2 \pm 0,68$. In the control group, the index Sum of Caries and Filled Teeth = $1,94 \pm 0,22$, Sum of Caries and Filled Surfaces = $1,54 \pm 0,12$, Carious, Filled and Extracted Teeth = $1,42 \pm 0,55$, Surfaces with Carious Formations + Sealed = $1,49 \pm 0,5$. In the period of late changeable bite (10-13 years old) and (14-18 years old) - at the final stage of bone tissue formation, the caries intensity indices exceeded those in the control group of patients even more. Acute initial caries was determined in 20,8% of cases with a lesion intensity equal to $4,02 \pm 0,8$; $4,6 \pm 0,24$.

When analyzing the data of the clinically examined main and control groups, a comparison was made of the intensity of caries in terms of the index of Carious, Filled and Extracted Teeth, Surface with Carious Formations + Filled in patients aged 6-9 years, 10-13 years and 14-18 years, from Diagrams № 4 and № 5 show that the intensity of tooth decay in the examined main group is significantly higher than in the control group, both in terms of indices of Carious, Sealed and Extracted Teeth and in terms of Surfaces with Carious Formations + Filled; also, it is noteworthy that in the index of Surfaces with Carious Formations + Filled in

the main group, the component of temporary teeth affected by caries (68,8%) was 1,8 times higher than that of filled temporary teeth (36,5%); extracted teeth accounted for 7,7%.

Diagram № 4. The defeat of the hard tissues of the teeth in the examined with dentoalveolar anomaly and dentoalveolar deformity in bronchial asthma (main group)

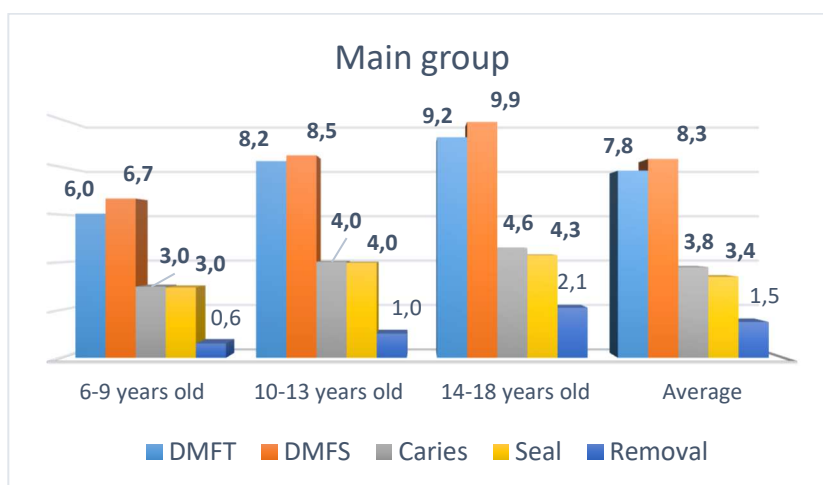
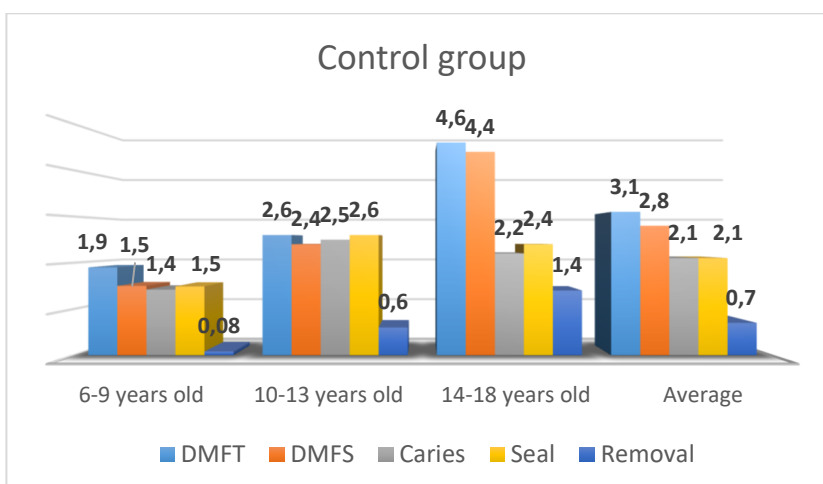


Diagram № 5. The defeat of the hard tissues of the teeth in the examined with dentoalveolar anomaly and dentoalveolar deformity in bronchial asthma (control group)



Thus, in the main group in all periods - early, late and final stages of occlusion, a high prevalence and intensity of dental caries was observed, significantly exceeding those of the control group.

With anomalies of the dentition, the state of periodontal tissues in patients is shown in Diagrams № 6 and № 7: the dominant clinical forms were chronic generalized catarrhal gingivitis (ChCG) (72,2%) and chronic generalized hypertrophic gingivitis (ChHG) (28,3% cases).

Diagram № 6. The frequency of chronic generalized catarrhal gingivitis in children and adolescents with dentoalveolar anomaly and dentoalveolar deformity in bronchial asthma (main group)

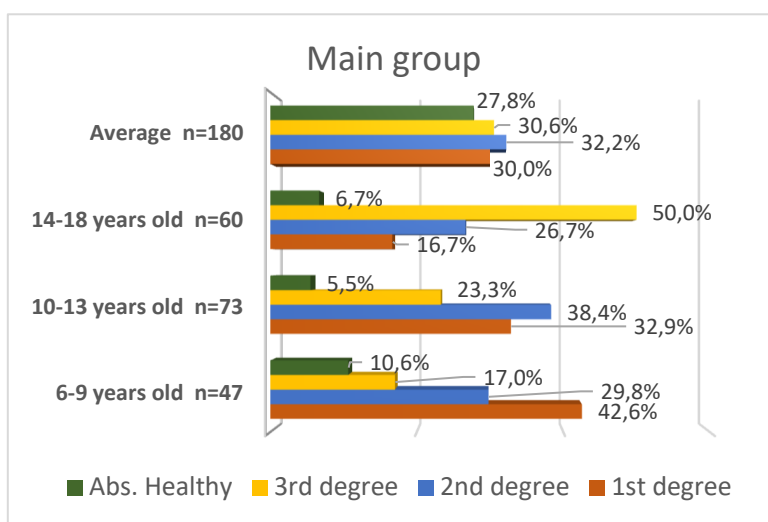
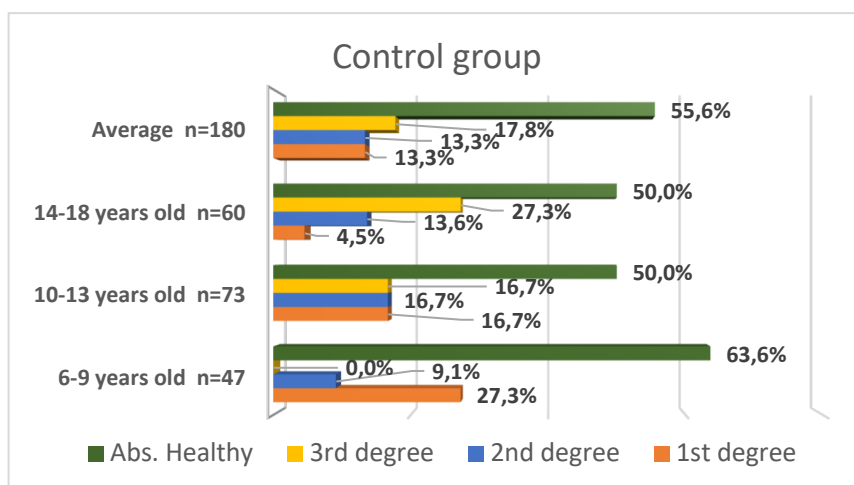


Diagram № 7. The frequency of chronic generalized catarrhal gingivitis in children and adolescents with dentoalveolar anomaly and dentoalveolar deformity (control group)



According to the analyzes, the results of the diagram indicate that predominantly in the main group in the period of the early and late stage of changeable bite, generalized catarrhal gingivitis of mild severity was observed (42,55%; 32,87%, respectively), while a severe degree was noted in the subjects (17,02 %, 23,28%). Most often, the clinical symptoms of gingivitis in the main group were determined with crowded teeth; the average value of the papillary-marginal-alveolar index in patients aged 6-9 years was 19,4%; 10-12 years old - 35,8%; 14-18 years old - 86,8%; on average, in the main group - 47,4%, in the control group - 6,6%. Analysis of the results shows that in the main group in the period of early, late changeable bite and the stage of formation of the dentition according to the Silness-Loe and Stallard indices, a satisfactory state of oral hygiene was determined: in the main group at the age of 6-9 years and 10-13 years, an unsatisfactory level of hygiene was recorded more often than in the control group; according to the index Papillary-marginal-alveolar index in the control group indicates that in the group "healthy children" the values of the Papillary-marginal-alveolar index more than 10 are rare. Also, the severity of inflammation in the gum tissues according to the Schiller Pisarev test was higher in children and adolescents with bronchial asthma.

Pathologies of the oral mucosa in the main group were significantly higher than in the control group: for example, in the main group, lesions of the oral mucosa and the red border of the lips were detected in 58,9% of cases, in the control group - in 8,2%

of cases; including the main group, chronic catarrhal stomatitis was detected in 54,62% of cases; 42,27% of cases of desquamative glossitis; in 6,4% of cases, atrophy of filiform and mushroom papillae and angular cheilitis was observed in 11,9% of cases.

In order to assess the effectiveness of the proposed combined method of treatment with the site of morphofunctional effectiveness of orthodontic removable (Main Group -1; Control Group-1) and non-removable (Main Group -2; Control Group -2) devices selected among the examined patients, regardless of gender and age were divided into two groups (25 patients from the Main Group -1, and the Main Group -2; 10 patients from the Control Group -1; Control Group -2) (table 3). When studying the biochemical state of the oral fluid (OF) of patients in dynamics, using orthodontic lamellar apparatuses, mechanically-combinedly acting in accordance with the established diagnosis, the following were assessed: the content of malondialdehyde (MDA), the activity of catalase, elastase, urease, lysozyme using a set of the company "HUMAN ", And also assessed the level of functional reactions in the oral cavity by fluctuations in the pH-value of the oral fluid and the assessment of the charge state of the cells of the buccal epithelium (Table 2).

Table № 2. Results of studying the activity of catalase, the content of malondialdehyde, elastase, urease and lysozyme in a group of children and adolescents with dentoalveolar anomaly and dentoalveolar deformity in bronchial asthma

Survey group	Study period	Catalase, Mkat	MDA	Elastases μ kat/L	Ureases, μ kat/L	Lysozyme un/mmol
MG-1	Before committing	0,214 $\pm$ 0,043	0,183 $\pm$ 0,0215	1,48 $\pm$ 0,14	0,212 $\pm$ 0,026	0,068 $\pm$ 0,008
CG-1	Before committing	0,364 $\pm$ 0,011	0,114 $\pm$ 0,02	1,68 $\pm$ 0,24	0,108 $\pm$ 0,022	0,098 $\pm$ 0,007
MG-2	Before committing	0,211 $\pm$ 0,29	0,330 $\pm$ 0,061	1,28 $\pm$ 0,12	0,266 $\pm$ 0,036	0,078 $\pm$ 0,007
CG-2	Before committing	0,298 $\pm$ 0,021	0,154 $\pm$ 0,08	1,76 $\pm$ 0,34	0,128 $\pm$ 0,032	0,086 $\pm$ 0,008

Note. p – p₁ – reliability of differences between indicators in children and adolescents of the main group of the subgroup and the control group; p₂ – reliability of differences from the baseline.

The results show that the catalase activity in the main group-1 and the main group-2 was 1,5-2 times lower than in the patients of the control group-1 and control group-2. It can be said about the depletion of the reserve capacity of the antioxidant system in the main group with BA. The MDA content was significantly higher than that of c/g-1 and c/g-2 (P <0.002, P <0.01); in children and adolescents c/g-1 and c/g-2, elastase activity was significantly reduced relative to the initial state by 1,5-2,0 times (P₂ <0.002), in m/g-1 and m/g-2 ; m/g-1 and 2 - the activity of lysozyme in the oral fluid was 2,5–3 times less than that of c/g-1 and 2; the activity of urease in m/g-1 and 2, on average, was 1,7-2,3 times higher than in c/g-1 and 2 (P <0.001); The charge state of buccal epithelial cells (BEC) m/g was almost 2 times lower than the average statistical norm and amounted to 28–32%, versus 48% in the examined c/g.

Table № 3. Algorithm for the treatment of children and adolescents with dentoalveolar anomalies and dentoalveolar deformities with pathologies of bronchial asthma

Removable denture (n=35) 32,11 %	MG-1 (n=25), 22,93 %	Removable orthodontic appliances (spring, screws, bow), plates and protective mouthguard; in 10 patients - dystopia 3/3, shortened upper jaw - 2-sided expanding spring and screw plate for a period of 8-12 months (6-13 years); in 8 patients have one-sided dentition defect - one-sided spring and screw plate and arch for a period of 6 to 12 months (12-18 years); in 4 patients with mixed deformation of the dentition and occlusion - 1 and 2-sided screw, spring plate and protective mouthguard; in 3 patients, supraocclusion - vestibular arch from 6 to 12 months (9-13 years). For local treatment of the oral cavity and orthodontic appliances, a decoction of leaves and young shoots of prostrate St. John's wort or four-winged St. John's wort was used 2 times a day; decoctions with the essential oil of the leaves of the mint plant were used to combat unpleasant odor in the mouth. Preparations for the treatment of bronchial asthma under the supervision of pulmonologists recommended aerosol "Fluxatide" 12.5 mg (60 doses) and Flixotide®, manufactured by "Glaxo Wellcom" S.A., containing 50-200 µg 2 times a day.
	CG-1 (n=10), 9,2 %	Removable orthodontic apparatus (spring, screws, arch), plates and protective mouthguard; in 10 patients - 3/3 dystopia, shortened upper jaw - 2-sided expanding spring and screw plate for a period of 8-12 months (6-13 years); in 8 patients have one-sided dentition defect - one-sided spring and screw plate and arch for a period of 6 to 12 months (12-18 years); in 4 patients, mixed deformation of the dentition and occlusion - 1 and 2-sided screw, spring plate and protective mouthguard; in 3 patients, supraocclusion - vestibular arch from 6 to 12 months (9-13 years);
Fixed prosthesis (n=35) 30,2 %	MG-2 (n=25), 21,5 %	Fixed orthodontic appliances (arches) - in 12 patients dystopia 3/3 - Edgewise (Breckit) device for a period of 9 to 12 months (10-18 years); in 5 patients, infra-occlusion 2/2 - Edgewise device for a period of 9 to 12 months; in 4 patients, mixed dentition deformity and occlusion - Edgewise (Breckit) protective mouthguard; in 3 patients, supra-occlusion - Edgewise vestibular arch (Breckit) for a period of 6 to 12 months (9-15 years); in one patient, supra-occlusion - Edgewise (Breckit) up to 12 months (13 years). For local treatment of the oral cavity and orthodontic appliances, a decoction of leaves and young shoots of prostrate St. John's wort or four-winged St. John's wort was used 2 times a day; decoctions with the essential oil of the leaves of the mint plant were used to combat unpleasant odor in the mouth. Preparations for the treatment of bronchial asthma under the supervision of pulmonologists recommended aerosol "Fluxatide" 12.5 mg (60 doses) and Flixotide®, manufactured by "Glaxo Wellcom" S.A., containing 50-200 µg 2 times a day.

	CG-2 (n=10), 8,6%	Fixed orthodontic appliances (arches) - in 12 patients dystopia 3/3 - Edgewise device (Brekkit) for a period of 9 to 12 months (10-18 years); in 5 patients, infra-occlusion 2/2 - Edgewise device for a period of 9 to 12 months; in 4 patients, mixed deformation of the dentition and occlusion - Edgewise (Brekkit) protective mouthguard; in 3 patients, supra-occlusion - Edgewise vestibular arch (Brecit) for a period of 6 to 12 months (9-15 years); in one patient, supra-occlusion - Edgewise (Brecit) up to 12 months (13 years).
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The results of the combined treatment and prophylactic work carried out by clinical examination of children are presented in table 4.

Table № 4. The state of hygiene of the oral cavity and periodontal tissues in children and adolescents with dentoalveolar anomaly and dentoalveolar deformity with bronchial asthma at the stage of the dynamics of treatment and prophylaxis

	Silness-Loe	Stallard	PMA%	Sample Sh-P.	Bleeding	Dental calculus	CPITN
MG-1 n =25	0,91±0,2 p,p1,p2> 0,05	1,18±0,2 p,p1,p2> 0,05	12,8±0,2 p,p1,p2> 0,05	1,8±0,02 p,p1,p2> 0,05	0,24±0,02 p,p1,p2> 0,05	0,27±0,02 p,p1,p2> 0,05	0,44±0,02 p,p1,p2> 0,05
MG-2 n =25	1,28±0,3 p,p2,p3> 0,05	1,34±0,3 p,p2,p3>0,05	13,80±0,3 2 p,p2,p3> 0,05	1,48±0,03 p,p2,p3> 0,05	0,18±0,02 p,p2,p3> 0,05	0,17±0,02 p,p2,p3> 0,05	0,38±0,02 p,p2,p3> 0,05
CG-1 n =10	88,8±0,5	1,28±0,4	10,8±0,3	1,04±0,02	0,19±0,02	0,16±0,04	0,22±0,03
CG-2 n =10	90,1±0,4	1,11±0,2	10,2±0,1	1,1±0,03	0,11±0,01	0,12±0,02	0,22±0,02

Note: p – reliability of differences between indicators MG-1, MG-2 and CG-1, CG-2;

p₁ – reliability of differences between MG-2 and MG-1;

p₃ – reliability of differences between indicators in comparison with the baseline.

The obtained results of the assessment of the state of oral hygiene improved significantly in all groups and were characterized as "good". In children and adolescents of the main group-1 (MG-1) and the main group-2 (MG-2), the values of the Silness-Loe index decreased 2-2,8 times and the Stallard index - 1,8-2,6 times, also comparisons of CG-1 and CG-2 by 1,5-2,1 times and 2,0-2,4 times, respectively. The PMA index value significantly ($P < 0.01$) improved compared to the data of the previous examination in all groups, that is, MG-1 and MG-2, which used a combined method of treatment (especially MG-2, where fixed orthodontic appliances were used), the PMA index decreased 3,5 times and the CG index decreased 2 times. After professional hygiene and the use of basic and developed prophylactic complexes in all groups, especially in MG-2 and MG-1, the intensity of inflammation in the gum tissues, the hygienic state of the oral cavity, the state of the oral mucosa, PMA, CPITN and others decreased.

According to the results of the study of the stability of the pH-Oral fluid in children and adolescents m/g 1 and 2, in the initial state, there was a high confidence interval of fluctuations in the value of the pH-Oral fluid ($pH = 0,30 \pm 0,04$; $0,24 \pm 0,02$), which indicates a low level of regulatory reactions that maintain homeostasis in the oral cavity, a decrease in caries resistance and the risk of developing inflammatory processes in the periodontal tissues (table 5).

Table № 5. Indicators of the interval of fluctuations in the pH of the oral fluid in those examined in the preparatory period of orthodontic treatment ($M \pm m$).

Terms of observation	Groups	MG-1 n=25	CG-1 n=10	MG-2 n=25	CG-2 n=10
The initial state		0,30±0,04 p>0,05	0,38±0,03	0,24±0,02 p>0,05	0,29±0,02
Before fixing the device		0,24±0,02 p>0,05	0,32±0,04	0,21±0,01 p>0,05	0,24±0,01

Note: p – the indicator of the reliability of differences from the comparison group; p1 is an indicator of the reliability of differences from the initial state.

Evaluation of the effectiveness of the developed treatment-and-prophylactic complex was carried out on the basis of the analysis of biochemical parameters characterizing the state of homeostasis and the level of nonspecific resistance (tables 6 and 7).

Table № 6 The results of the biochemical composition of the oral fluid in dynamics in patients examined with dentoalveolar anomalies and dentoalveolar deformities with bronchial asthma, carried out using removable orthodontic appliances

QF substrates Research term and groups		Catalase, Mkat	MDA	Elastases μkat	Ureases, μkat	Lysozyme un/mmol
The initial state	MG-1	0,119±0,011 p<0,001 p1>0,8	0,288±0,022 p<0,01 p1>0,5	2,48±0,13 p>0,5 p1>0,3	0,527±0,024 p<0,001 p1>0,2	0,042±0,008 p<0,001 p1>0,4
	CG -1	0,248±0,021	0,173±0,082	2,45±0,11	0,264±0,02	0,088±0,011
Before committi ng	MG-1	0,214±0,043 p>0,1 p1<0,2 p1<0,2	0,183±0,021 p>0,2 p1>0,05 p1<0,2	1,48±0,14 p>0,5 p1>0,002 p2>0,2	0,212±0,026 p>0,2 p1<0,002 p2>0,2	0,068±0,008 p<0,2 p2<0,01
	CG -1	0,364±0,011 p<0,5	0,114±0,02 p>05	1,68±0,24 p<0,5	0,108±0,022 p>0,5	0,098±0,007 p<0,5
After 10 days	MG-1	0,198±0,09 p>0,3 p1<0,001 p2>0,004	0,348±0,032 p<0,001 rp1<0,01 p2>0,5	2,86±0,18 p>0,5 p1>0,5 p2>0,3	0,300±0,026 p>0,2 p<0,001 p<0,002	0,094±0,022 p>0,2 p1<0,001
	CG -1	0,267±0,014 p2<0,2	0,156±0,012 p2<0,02	2,88±0,24 p2<0,04	0,220±0,028 p2>0,02	0,124±0,017 p2<0,02
A month later	MG -1	0,244±0,022 p2<0,009	0,288±0,022 p<0,001 p1<0,05 p2>0,5	2,58±0,16 p>0,5 p1<0,5 p2>0,3	0,272±0,017 p>0,02 p<0,001 p<0,005	0,064±0,002 p<0,001 p<0,001

	CG -1	0,240±0,02 p ₂ <0,2	0,148±0,014 p ₂ <0,03	2,22±0,21 p ₂ >0,2	0,201±0,026 p ₂ >0,02	0,078±0,007 p ₂ <0,02
In 6 months	MG -1	0,319±0,021 p>0,04 p ₁ <0,001 p ₂ <0,001	0,248±0,014 p>0,5 p ₁ <0,001 p ₂ <0,01	2,08±0,13 p<0,001 p ₁ <0,01 p ₂ >0,5	0,244±0,019 p>0,2 p<0,002 p>0,001	0,034±0,002 p<0,001 p ₁ >0,2
	CG -1	0,286±0,022 p ₂ <0,2	0,174±0,024 p ₂ >0,04	1,68±0,14 p ₂ <0,002	0,175±0,034 p ₂ >0,02	0,048±0,008 p ₂ <0,02
In a year	MG -1	0,304±0,019 p>0,01 p ₁ <0,002 p ₂ <0,004	0,226±0,014 p>0,05 p ₁ <0,001 p ₂ <0,01	1,48±0,11 p<0,001 p ₁ <0,01 p ₂ >0,5	0,200±0,014 p>0,01 p ₁ <0,001 p ₂ <0,002	0,028±0,004 p<0,001 p ₁ >0,04 p ₂ <0,001
	CG-1	0,248±0,033 p ₂ <0,2	0,114±0,02 p>0,05	1,98±0,16 p ₂ <0,002	0,142±0,016 p ₂ <0,002	0,078±0,008 p>0,05

Note: p – p₁ – reliability of differences between indicators in children and adolescents from MG and CG;

p₂ – reliability of differences from the baseline.

The results demonstrated an increase in the activity of catalase in the oral fluid in all groups, especially this tendency was more pronounced in children and adolescents m/g-1 and m/g-2. The activity of the enzyme was 2,2 times lower than that of c/g-1 and c/g-2. A week later, a significant increase in the level of MDA was recorded both in m/g-1 and m/g-2, and in c/g-1, c/g-2. A month later, a high content of MDA was determined especially in m/g-1, partly m/g-2 with c/g-1 and c/g-2. After 6 months and a year later, c/g-1 and c/g-2 retained a high content of MDA in the OF relative to the values of m/g-1 and m/g-2 (P <0.002, P <0.01), which testified to the accumulation of lipid peroxidation products. Decrease in elastase activity in c/g-1 and c/g-2, relative to the initial state m/g -1 and 2 by 1,7-2,0 times.

According to the content of lysozyme in the OF, it indicates that in m/g-1 and m/g-2 the activity of lysozyme in the pan was 2,7–3 times less than that in c/g-1 and c/g-2. After therapeutic measures, the degree of enzyme activity increased in both m/g, however, in m/g-1, the activity of lysozyme was higher than in m/g-2 and c/g-1 and 2. At the same time, after 6 months and a year after the start of the use of the device, the content of lysozyme in this group was significantly higher than that of c/g 1 and 2 (P₁ <0,001, P₁ <0,001), which proves the antimicrobial effect of the proposed prophylactic complex stimulating the development of its own nonspecific antimicrobial factor in the oral cavity.

The biochemical composition of the oral fluid according to the results of treatment with non-removable orthodontic appliances is shown in Table 7.

Table № 7 The results of studying the dynamics of catalase activity, the content of MDA, elastase, urease and lysozyme in a group of children and adolescents with dentoalveolar anomaly and dentoalveolar deformity with bronchial asthma carried out using fixed orthodontic appliances.

OF substrates Research term and groups		Catalase, Mkat	MDA	Elastases μkat	Ureases, μkat	Lysozyme un/mmol
The initial state	MG-2	0,176±0,041 p <0,001	0,318±0,042 p >0,01	2,78±0,18 p>0,5	0,452±0,032 p>0,001	0,054±0,008 p>0,4

	CG -2	0,288±0,044	0,198±0,042	2,95±0,14	0,221±0,019	0,076±0,009
Before committin g	MG -2	0,211±0,29 p>0,1 p1<0,2	0,330±0,061 p>0,2 p1<0,05	1,28±0,12 p>0,5 p1<0,002	0,266±0,036 p>0,2 p1<0,002	0,078±0,007 p>0,001 p1<0,02
	CG -2	0,298±0,021 p2<0,001	0,154±0,08 p2<0,001	1,76±0,34 p2<0,001	0,128±0,032 p2<0,001	0,086±0,008 p2<0,001
After 10 days	MG -2	0,180±0,04 p>0,3 p1<0,001 p2>0,004	0,328±0,043 p<0,001 p1<0,01 p2>0,5	2,86±0,18 p>0,5 p1>0,5 p2>0,3	0,278±0,016 p>0,2 p<0,001 p<0,002	0,074±0,002 p>0,2 p1<0,001
	CG -2	0,234±0,02 p2<0,2	0,166±0,02 p2<0,02	2,78±0,24 p2<0,04	0,200±0,03 p2>0,02	0,114±0,017 p2<0,02
A month later	MG -2	0,198±0,022 p<0,01 p1<0,05 p2>0,5	0,300±0,042 p<0,001 p1<0,05 p2>0,5	2,68±0,12 p>0,5 p1<0,5 p2>0,3	0,286±0,02 p>0,02 p<0,001 p<0,005	0,060±0,002 p<0,001 p<0,001
	CG -2	0,248±0,02 p2<0,2	0,158±0,014 p2<0,03	2,42±0,33 p2>0,2	0,226±0,046 p2>0,02	0,098±0,007 p2<0,02
In 6 months	MG -2	0,248±0,042 p>0,04 p1<0,001 p2<0,001	0,268±0,004 p>0,5 p1<0,001 p2<0,01	2,56±0,23 p<0,001 p1<0,01 p2>0,5	0,268±0,02 p>0,2 p<0,002 p>0,001	0,074±0,002 p<0,001 p1>0,2
	CG-2	0,286±0,022 p2<0,2	0,184±0,03 p2>0,04	1,98±0,14 p2<0,002	0,112±0,038 p2>0,02	0,068±0,008 p2<0,02
In a year	MG -2	0,260±0,001 p>0,01 p1<0,002 p2<0,004	0,279±0,01 p>0,05 p1<0,001 p2<0,01	2,28±0,11 p<0,001 p1<0,01 p2>0,5	0,262±0,001 p>0,01 p1<0,001 p2<0,002	0,058±0,004 p>0,04 p1<0,001 p2<0,002
	MG -2	0,268±0,012 p2<0,2	0,144±0,04 p>0,05	1,54±0,16 p2<0,002	0,122±0,012 p2<0,002	0,098±0,008 p>0,05

Note: p – p₁ – reliability of differences between indicators in children and adolescents of the main group of the subgroup and the control group; p₂ – reliability of differences from the baseline.

Thus, in children and adolescents with bronchial asthma, the frequency of dentoalveolar anomalies in the period of early mixed bite exceeds the value of practically healthy children and adolescents; at the same time, crowding of teeth, narrowing of the jaws, distal occlusion, deep incisal disocclusion prevail in the structure of the dentoalveolar anomaly. In the examined children and adolescents of MG, there is a decrease in nonspecific resistance and the level of functional reactions responsible for homeoresis, which is manifested by a high confidence interval of fluctuations in the pH-OF value and a 2-fold decrease in the electrophoretic mobility of the nuclei of the buccal epithelium cells, compared with the average norm. Also, they have an imbalance in the prooxidant-antioxidant system, a decrease in antimicrobial protection and an increase in the degree of contamination by pathogenic and opportunistic microflora.

V. CONCLUSIONS

- in children and adolescents with bronchial asthma, the frequency of pathology of the oral cavity and dentoalveolar anomalies in the period of early mixed bite exceeds the value of practically healthy children and adolescents. Including caries damage to hard tooth tissues and their intensity, pathology of periodontal tissue and oral mucosa, deterioration of the hygienic state of the oral cavity. At the same time, crowding of teeth, narrowing of the jaws, distal occlusion, deep incisal disocclusion prevail in the structure of the dentoalveolar anomaly.

- in the treatment of dentoalveolar anomaly and dentoalveolar deformity in children and adolescents with bronchial asthma with removable lamellar devices, the risk of complications in the form of damage to hard tissues of teeth, periodontal tissues and oral mucosa increases. At the same time, contact stomatitis, angular cheilitis, hypertrophic and catarrhal gingivitis are more often observed in comparison with the use of a non-removable orthodontic appliance. The proposed method as a general one - preparations "Flixotide" and aerosol "Fluxatide" for the treatment of bronchial asthma under the supervision of a pulmonologist, also for local treatment of the oral cavity and orthodontic appliances, a decoction of leaves and young shoots of prostrate St. John's wort or four-winged St. John's wort was used 2 times a day, for decoctions with the essential oil of the leaves of the mint plant were used to combat bad breath.

The obtained result of the biochemical study confirms the positive clinical effect achieved by stimulating local nonspecific resistance, increasing the activity of stress-limiting antioxidant and antimicrobial defense systems. As a result, the intensity of lipid peroxidation, the severity of inflammatory reactions decrease, the growth of opportunistic microflora slows down, providing a decrease and stability of the confidence interval of fluctuations in pH with oral fluid, normalizing the charge state of the buccal epithelium cells, and, consequently, the general functional activity of the cell.

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