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The State Of The Oral Cavity With Dental Anomalies In Children With Bronchial Asthma

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ABSTRACT

The study was conducted to assess the dental state of the oral cavity in children and adolescents with dentoalveolar anomalies against the background of bronchial asthma. A comprehensive epidemiological survey was carried out in 225 children and adolescents, divided into two groups. The main group of 180 included patients with dentoalveolar anomalies and deformities suffering from bronchial asthma, and the Control group of 45 patients without somatic pathology. Both groups were divided into age categories 6-9 years old, 10-13 years old and 14-18 years old. In the course of clinical research, the state of the hard tissues of the tooth, periodontal tissues and oral mucosa, as well as the frequency of dentoalveolar anomalies and deformities, the level of oral hygiene were studied.

KEYWORDS

Children and adolescents, oral cavity, bronchial asthma, dentoalveolar anomalies and deformities, diagnosis, treatment, prevention.

INTRODUCTION

We know about the structure of dental diseases, where dentoalveolar anomalies and deformities (DVA and DVD) have a significant proportion [1, 3, 6, 13, 19]. And also, all specialists know that one of the factors that maintains a significant frequency of

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morphological and functional disorders in the dentoalveolar system (DVS) in children are general somatic diseases [4, 5].

The authors found that the intersystem integration of the functional state of the dentoalveolar and respiratory system [12, 15, 23, 24] also draws attention to the tendency for the growth of disorders of the dentoalveolar system in different age periods, with a significant increase in the frequency of dentoalveolar anomalies, as in children and in adults over the past 15-20 years. Analysis of genealogical information about probands and their parents of the population on the basis of "bite" indicates that in the generation of children, bite anomalies are more pronounced than in their parents. The above negative trend is due to the fact that stable pathogenetic factors are involved in the formation of morphological and functional disorders in the dentition, which maintain a consistently high level of prevalence in the population. In addition, there are works that reveal the causal relationship between the ecological state of the territory of residence and the prevalence of major dental diseases and dentoalveolar anomalies in children and adolescents, in particular [9].

Unfavorable environmental factors negatively affect the general health of children, reducing the level of both somatic and dental health. For example, when studying the frequency of dentoalveolar anomalies in children with different levels of health, scientists identify etiopathogenetic links between various diseases of the body and the formation of pathological disorders in dentoalveolar systems [22]. The mechanisms of the development of dentoalveolar deformity in the pathology of ENT organs, where the leading factor are orofacial dysfunctions, are most fully disclosed. It was also found that diseases of organs and systems in children and adolescents are combined with an increase in the frequency of dentoalveolar anomalies and deformities. Such syntropy is typical for disorders of the musculoskeletal system [5, 8, 14, 16, 17], endocrine diseases, diseases of the cardiovascular system, allergopathology and rickets.

MATERIALS AND METHODS

Analysis of literary sources indicates that the state of the dento-maxillofacial complex in children with bronchial asthma has not been sufficiently studied. It is necessary to concretize the prevalence of clinical forms of anomalies and deformities of the dentition in this contingent, at the same time, removable and non-removable orthodontic appliances are widely used in these children in the period of mixed dentition to eliminate dentoalveolar anomalies and deformities [2].

However, all constructions that are currently used in orthodontic practice, to one degree or another, violate homeostasis, the microbial landscape in the oral cavity, negatively affect the periodontal tissues, tissues of the prosthetic bed, local immunity and others [7, 10, 11, 26, 22, 27]. This helps to reduce the barrier properties of the oral mucosa (MMOC) and, in turn, creates unfavorable conditions for instrumental treatment, increasing the effect of microflora and other pathogenic factors. Thus, a comparative assessment of the dental status in children with bronchial asthma, the study of the prevalence and structure of dentoalveolar anomalies and deformities, the analysis of the influence of orthodontic appliances on the level of functional and adaptive reactions, the development of a strategy for the complex treatment of dentoalveolar anomalies are topical issues.

RESULT AND DISCUSSION

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The aim of the study is to assess the dental condition of the oral cavity in children and adolescents with dentoalveolar anomalies against the background of bronchial asthma.
To determine the dental status in children and adolescents with bronchial asthma, a comprehensive clinical examination was carried out in 180 patients (main group - MG) aged from 6 to 18 years. Of these, in accordance with the case histories, 88 children were diagnosed with an intermittent form of bronchial asthma and 92 children were diagnosed with mild and moderate persistent forms of the disease. At the same time, we divided them into age groups - 6-9 years (early period of mixed bite), 10-13 years (late period of mixed bite) and 14-18 years (fully formed period of bite and bones of the dentition) (Table № 1). During the examination, the state of hard tissues of the tooth, periodontal tissues and oral mucosa, as well as the frequency of dentoalveolar anomalies and deformities, and the level of oral hygiene were studied. The survey was carried out on the basis of the Department of "Dentistry, Pediatric Dentistry and Orthodontics" TashIAMS. The control group (CG) included 45 children and adolescents with dentoalveolar anomalies and deformities without somatic pathology.

Table № 1.

Distribution of examined children and adolescents by type of orthodontic apparatus, age and sex (M + m)

Number of children and adolescents in groups												
Age	**Main group**				**Total n=180**		**Control group**				**Total n=45**	
	Boys n=112		**Girls n=68**				**Boys n=25**		**Girls n=20**			
	abs.	**%**	**abs.**	**%**	**abs.**	**%**	**abs.**	**%**	**abs.**	**%**	**abs.**	**%**
6-9	32	24,4	15	6,7	**47**	**31,1**	7	15,8	4	10,5	**11**	**26,3**
10-13	45	30,3	28	17,7	**73**	**47,8**	7	15,8	5	15,8	**12**	**31,6**
14-18	35	12,2	25	8,9	**60**	**21,1**	11	21,0	11	21,0	**22**	**42,1**
Всего	**112**	**100**	**68**	**100**	**180**	**100**	**25**	**100**	**20**	**100**	**45**	**100**
n=225 100%	**112**	**49,8**	**68**	**30,2**	**180**	**80,0**	**25**	**11,1**	**20**	**8,9**	**45**	**20,0**

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 - of the oral fluid, a diagnostic model was studied, orthopantomogram images in children and adolescents were analyzed.

The algorithm of the clinical examination corresponded to the classical scheme and included the collection of subjective data, medical history from the district therapist and pediatrician, as well as objective research methods. 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 [25]. During an external

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examination, height, physical development, physique, posture were assessed, proportionality, facial symmetry, profile type, and the presence of facial signs of dentoalveolar anomalies were determined. During 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 oral mucosa 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 function of breathing, swallowing, speech, and the temporomandibular joint was assessed. Clinical functional tests of Eshler-Bitner and Ilyina-Markosyan were performed.

For the final diagnosis, additional research methods were used: anthropometric measurement of diagnostic jaw models, orthopantomography, and teleradiography. The diagnosis was made in accordance with Angle's classification, as well as with the classification of occlusion anomalies of the dentition and jaws [16, 19].

In clinical studies, indices for assessing the state of hard tissues of teeth KPZ, KPP, KPUz, KPUp, indices of the condition of periodontal tissues - PMA%, bleeding, Schiller-Pisarev test (SH-P), CPITN and the level of oral hygiene - Silness-Loe, Stallard were used [20]. Statistical processing of the results was carried out on the basis of the principles of variation statistics according to the Student's criteria using the computer statistical programs Statistica 8.0. To analyze the relationship between the signs, the Spearman correlation analysis was used. Differences were considered statistically significant at $p < 0.05$.

According to the results obtained during an epidemiological survey of 225 children and adolescents, including 180 with bronchial asthma, it was revealed that the frequency of dentoalveolar anomalies in the early period of mixed dentition (6-9 years) was on average 26.1%, in the late changeable bite (10-13 years old) - 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. From the obtained results of the control group, in children and adolescents of 14-18 years of age, they demonstrate statistically unreliable data (table № 2).

The data presented in the tables demonstrate that in the structure of dentoalveolar anomalies in the examined Main group, in the age group 6-9 years old, dental position anomalies (17.1%), edentulous (17.1%), mesial occlusion (12.8%) dominated. ; in the age group 10-13 years old - 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 discclusion (9.6%). In the Control group 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 of teeth (18.2 ; 16.7); crowding of teeth (13.6%), which did not have somatic diseases, and the most often revealed anomalies in the position of individual teeth (48.9%). In the period of late changeable bite in the main group, there was an increase in the revealed dentoalveolar anomalies, namely, anomalies in the position of the teeth.

The indicators of these ongoing studies coincided with the opinions of other authors of early studies [21], where this trend was explained by an increase in the number of permanent teeth during the formation of a permanent bite against the background of a pronounced tendency to narrowing of the alveolar arches, where, in the main group, there was a delay in the eruption of permanent teeth in most cases.

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Table № 2

Orthodontic condition in examined children and adolescents

Obs. children and others. by age	Children and adolescents with BA n = 180						Control group n = 45					
	6-9 years old n=47		10-13 years old n=73		14-18 years old n=60		6-9 years old n=11		10-13 years old n=12		14-18 years old n=22	
Dentofacial anomalies and deformities	**Abs**	%	**Abs**	%	**abs**	%	**Abs**	%	**abs**	%	**abs**	%
Tooth position anomalies	8	17,1	8	10,9	10	16,7	2	18,2	1	8,3	3	13,6
Adentia	8	17,1	9	12,3	4	6,7	3	27,3	2	16,7	2	9,1
Tremes, diastemas	4	8,5	9	12,3	4	6,7	2	18,2	2	16,7	3	13,6
Crowding teeth	5	10,6	13	17,8	15	25,0	1	9,1	1	8,3	3	13,6
Narrowing of the jaws	5	10,6	10	13,7	13	21,7	-	-	1	8,3	2	9,1
Distal occlusion	5	10,6	9	12,3	12	20,0	1	9,1	2	16,7	2	9,1
Mesial occlusion	6	12,8	3	4,1	-	-	-	-	1	8,3	1	4,5
Deep incisal discclusion	3	6,4	7	9,6	2	3,3	1	9,1	1	8,3	2	9,1
Vertical incisal discclusion	2	4,2	3	4,1	-	-	1	9,1	1	8,3	2	9,1
Transver. anam. occlusions	1	2,1	2	2,7	-	-	-	-	1	8,3	1	4,5
Number of dentoalveolar anomalies, average	**47**	**26,1**	**73**	**40,5**	**60**	**33,3**	**11**	**24,4**	**12**	**26,7**	**22**	**48,9**
Total 225, of which	**47**	**20,9**	**73**	**32,4**	**60**	**26,7**	**11**	**4,9**	**12**	**5,3**	**22**	**9,8**

When evaluating the data of clinical functional tests performed during the clinical examination in the main herpa, orofacial dysfunctions were revealed: dysfunctions of respiration, speech, and swallowing (Table № 3).

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Table № 3

Functional disorders in the examined children and adolescents

Functional impairment	Children and adolescents with asthma. Number - 180.						Control group. Quantity-45.					
	6-9 years old; n=47		10-13 years old n=73		14-18 years old n=60		6-9 years old n=11		10-13 years old n=12		14-18 years old n=22	
	Abs	%	abs	%	Abs	%	Abs	%	abs	%	abs	%
Breath	20	44,4	34	50,0	26	47,3	-	-	1	20,0	1	16,7
Speeches	6	13,3	10	14,7	7	12,7	1	25,0	1	20,0	2	33,3
Swallowing	5	11,1	10	14,7	6	10,9	1	25,0	1	20,0	1	16,7
Concomitant violation	14	31,1	14	20,6	16	29,1	2	50,0	2	40,0	2	33,3
total 180/168	**45**	**25,0**	**68**	**37,7**	**55**	**30,5**	**4**	**2,4**	**5**	**2,7**	**6**	**3,3**

As can be seen from the data in the tables, in children and adolescents of the Main group, orofacial dysfunctions were diagnosed with a higher frequency than in children without somatic diseases. The most common clinical signs of oral respiration were revealed: a symptom of "glossoptosis", dryness of the red border of the lips, violation of lip closure. Infantile type of swallowing was detected in children with bronchial asthma almost 2 times more often than in practically healthy children. It is noteworthy that in children with bronchial asthma in the period of early mixed bite, considered myofunctional problems were recorded 2.5 times more often than in healthy children, in the period of late mixed bite - 4 times. In a number of patients examined in the main group, there is a tendency in the dependence of the relative frequency of dentoalveolar anomalies on the age period of the dentoalveolar system in children and adolescents of the main group. In the early period of mixed dentition, there was an increase in the number of anomalies in the position of the teeth, anomalies of the dental arches and anomalies in the bite. In the period of late mixed dentition, there was a slight decrease in the relative frequency of dentoalveolar anomalies in this category of children, the level of which remained quite high.

This indicates the effectiveness of the mechanisms of self-regulation of morphological disorders in the dentition in the dynamics of the formation of a permanent bite in children and adolescents who belong to the group of practically healthy. At the stage of scientific research, a comparison was made in terms of the relative frequencies of dentoalveolar anomalies in the subjects of the Control and Main groups. Student's t-test was used to assess the difference between the arithmetic means of the two samples. Based on the values of the significance level p = 0.508 for the assumption of equality of variances and p = 0.504 for the assumption of inequality of variances, we concluded that there was no statistically significant difference between the arithmetic mean of the relative frequencies of dentoalveolar anomaly in the examined Control and Main groups. Also, using the methods of nonparametric statistics in order to compare the medians and distributions of two samples, the significance level of the median test for independent samples was determined p = 0.815, the Mann-Whitney U test for independent samples p = 0.444 and the

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Kolmogorov - Smirnov test for independent samples p = 0.762. This means that there is no statistically significant difference in the relative frequencies of dentoalveolar anomalies in the Control group and the Main group.

According to the results of the study, it was also determined that the prevalence of caries in the subjects during the period of mixed bite was on average 90.4%. In children and adolescents of the main group aged 6-9 years, the intensity of caries according to the KPZ index was 6.04 ± 0.42, KPP - 6.67 ± 0.4, KPUz - 2.98 ± 0.2, KPUp - 2, 95 ± 0.3. It is characteristic that 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 ± 0.68. In the control group, KPZ index = 1.94 ± 0.22, KPp = 1.54 ± 0.12, KPUz = 1.42 ± 0.55, KPUp = 1.49 ± 0.5.

In the period of late changeable bite (10-13 years old) and (14-18 years old) - in the final stage of bone tissue formation, the caries intensity indices exceeded those in the Control group of children and adolescents even more. Acute initial caries was determined in 20.8% of cases with a lesion intensity equal to 4.02 ± 0.8; 4.6 ± 0.24. Also, a comparison was made of the intensity of caries in children and adolescents 6-9 years old; 10-13; 14-18 years of the Main and Control groups, using the Student's t-test to assess the differences between the arithmetic mean of the KPZ in the Main group. Reliable statistical data were obtained between the groups and practically healthy ones, which means that the lesion of caries of hard tissues of teeth directly depends on age, severity of dentoalveolar anomaly and somatic pathology.

When analyzing the data of the clinically examined patients of the Main and Control groups, a comparison was made of the intensity of caries in terms of the indexes of KPUz, KPUp in children and adolescents aged 6-9 years, 10-13 years old and 14-18 years old (diagram No. 1.1 and 1.2).

Diagram № 1.1

The intensity of dental caries in children and adolescents with bronchial asthma in the main group at the age of 6-9, 10-13 and 14-18 years

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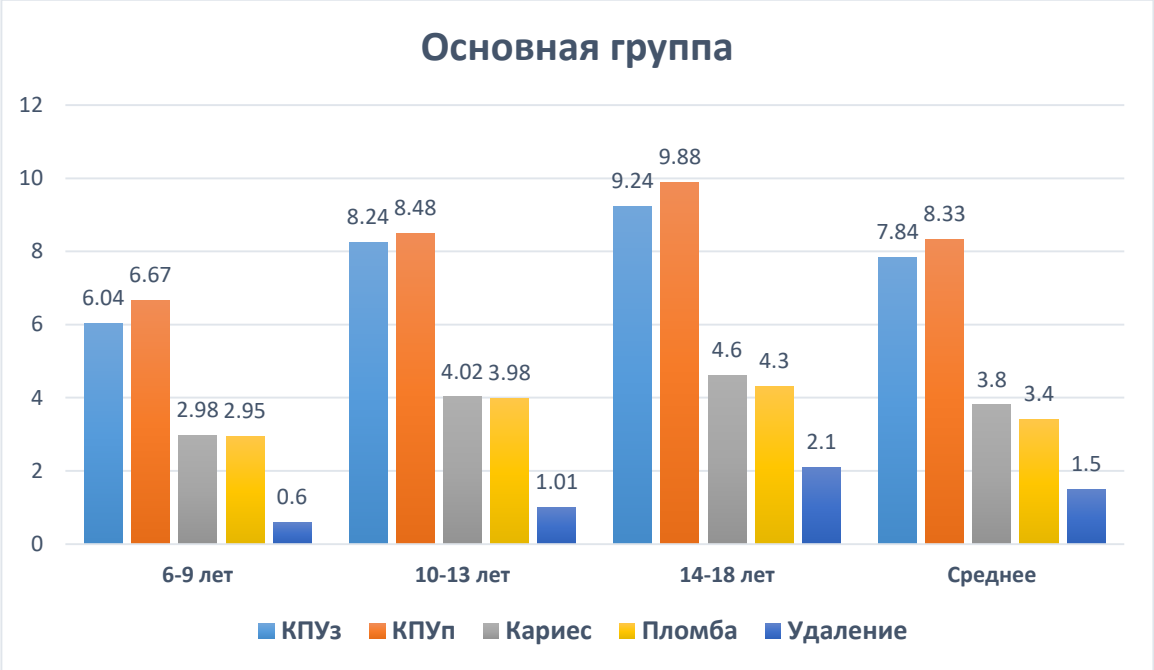
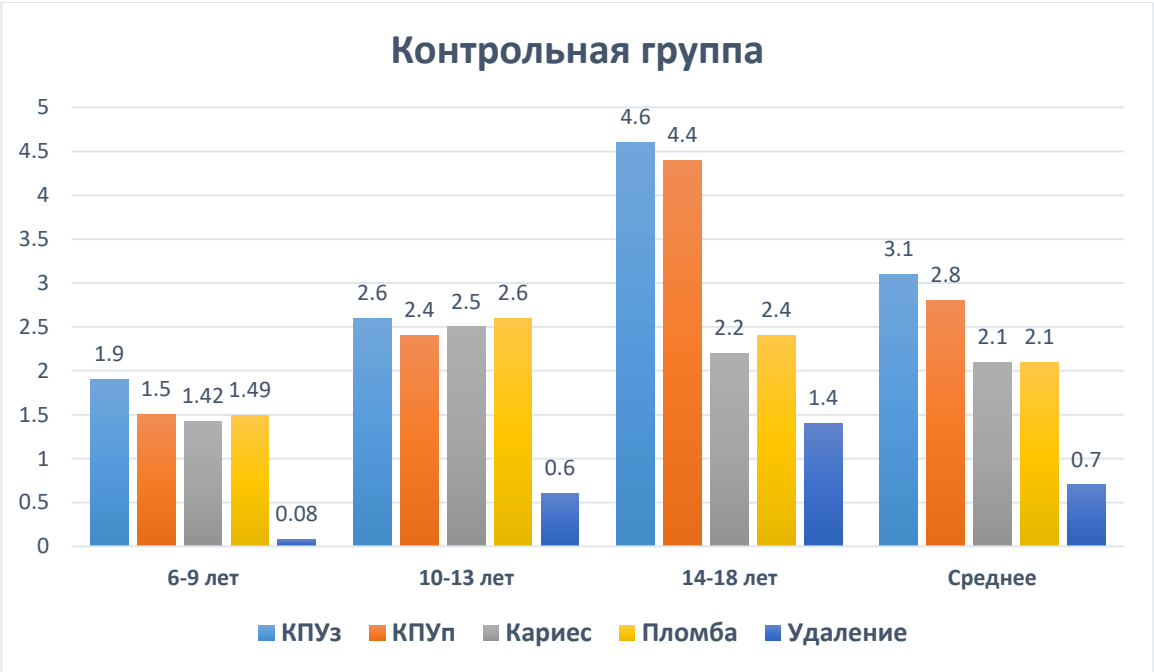


Diagram No. 1.2

The intensity of dental caries in children and adolescents with bronchial asthma in the Control group at the age of 6-9, 10-13 and 14-18 years



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These diagrams demonstrate that the intensity of tooth decay in the examined main group is significantly higher than in the Control group, both in terms of the indices of KPUz and in terms of KPUp. It is noteworthy that in the KPUp index for the main group, the component K (68.8%) was 1.8 times higher than P (36.5%). Extracted teeth accounted for 7.7%. In the Control group, the number of filled cavities (P = 52.1%) was 30% higher than the number of carious cavities (K = 62.1%). The component Y in the KPUp index in this group was 5.7%.

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 in the Control group.

In the course of the work, the influence of anomalies of the dentition on the condition of the periodontal tissues in children and adolescents of the main group was analyzed (Diagrams №. 2.1 and 2.2). The dominant clinical forms were chronic generalized catarrhal gingivitis (CCG) (in 72.2% of cases) and chronic generalized hypertrophic gingivitis (CHG) (in 28.3% of cases).

Diagram № 2.1

Frequency of chronic generalized catarrhal gingivitis in children and adolescents with bronchial asthma of the main group ages 6-9, 10-13 and 14-18

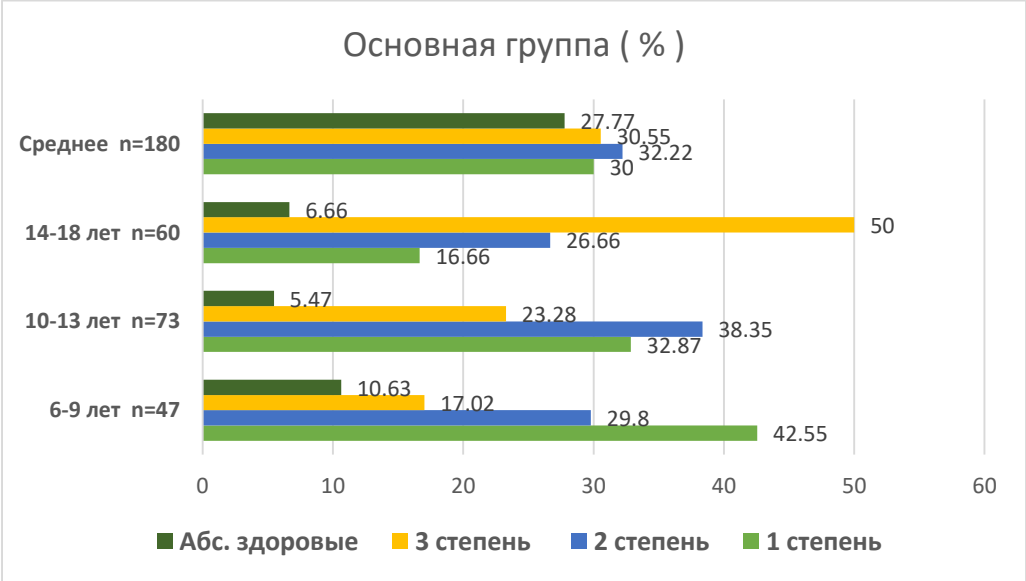

Diagram № 2.2

Frequency of chronic generalized catarrhal gingivitis in children and adolescents with bronchial asthma in the Control group at the age of 6-9, 10-13 and 14-18 years old.

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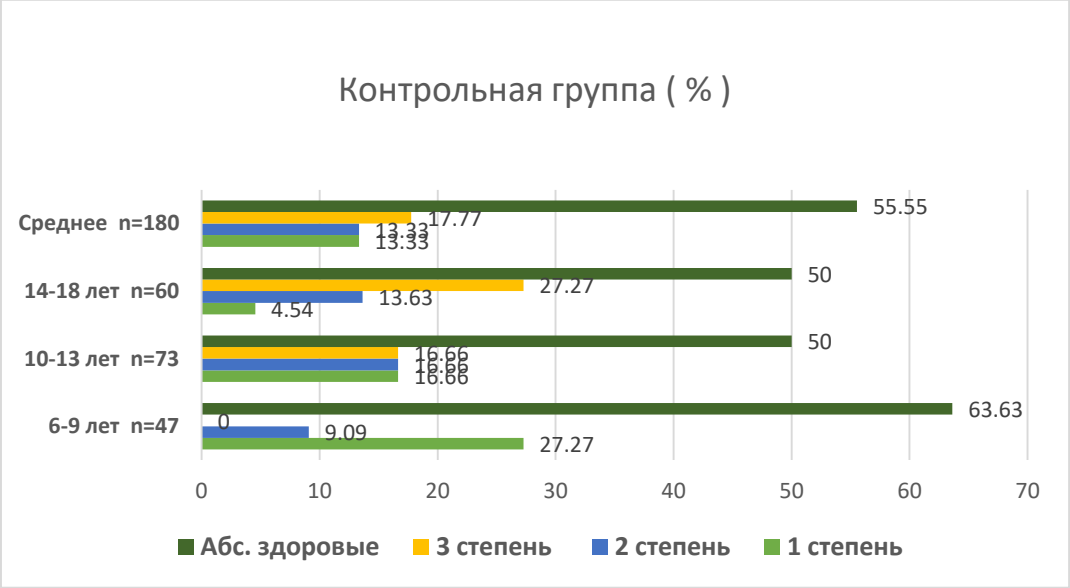

The data presented in the diagram indicate that predominantly in children and adolescents of the Main group in the period of the early and late stage of mixed bite, chronic generalized catarrhal gingivitis of mild severity was observed (42.55%; 32.87%, respectively), while a severe degree in the studied (17.02%, 23.28%). With age, there was a tendency for the aggravation of inflammatory changes in the periodontal tissues, the incidence of severe chronic generalized catarrhal gingivitis increased to 50% (14-18 years).

The most common clinical symptoms of gingivitis in the main group were determined with crowded teeth, the average value of the PMA index in children and adolescents 6-9 years old was 19.4%, in children and adolescents 10-12 years old - 35.8%, in children and adolescents 14- 18 years old - 86.8%; on average in the Main group - 47.4%, in the Control group - 6.6% (table № 4).

Table № 4

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The results of an index assessment of the state of periodontal tissues and oral hygiene in children and adolescents with BA and in CG

Age group	Abs.	Silness-Loe	Stallard	Sample. Shiller Pisar-a	Hematology	Dental calculus	PZDK	CPITN	PMA
6-9 years old	MG	31,9±1,8 p<0,05	1,62±0,08 p<0,05	1,68±0,04 p<0,05	0,22±0,04 p<0,05	0,04±0,06 p<0,05	-	0,24±0,06 p<0,05	19,4±1,2 p<0,05
	CG	27,3±1,1	0,62±0,12	0,68±0,12	0,07±0,01	0,02±0,01	-	0,12±0,02	4,86±1,4
10-13 years old	MG	50,7±1,4 p<0,05	1,98±0,76 p<0,05	1,72±0,08 p<0,05	0,98±0,1 p<0,05	0,56±0,08 p<0,05	0,08±0,02 p<0,05	0,98±0,03 p<0,05	35,8±1,76 p<0,05
	CG	33,3±1,1	0,86±0,9	0,78±0,18	0,62±0,08	0,22±0,08	-	0,35±0,08	6,84±1,8
14-18 years old	MG	61,7±1,1 p<0,05	2,1±0,9 p<0,05	1,98±0,02 p<0,05	1,42±0,1 p<0,05	0,92±0,01 p<0,05	0,86±0,12	1,2±0,06 p<0,05	86,8±0,09 p<0,05
	CG	31,8±0,9	0,88±0,14	0,98±0,12	0,94±0,09	0,34±0,06	0,06±0,08	0,67±0,08	8,22±2,8
Middle	MG	48,1±1,1 p<0,05	1,98±0,4 p<0,05	1,80±0,02 p<0,05	0,88±0,04 p<0,05	0,50±0,02 p<0,05	0,47±0,02 p<0,05	0,8±0,02 p<0,05	47,4±1,2 p<0,05
	CG	30,8±0,9	0,78±0,8	0,82±0,18	0,54±0,09	0,19±0,04	0,06±0,09	0,4±0,08	6,6±2,1

Note. p - significance of differences between groups.

The numerical values of the tables demonstrate that in the main group in the period of early, late changeable bite and the stage of formation of dentoalveolar systems in accordance with 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. Analysis of the results obtained for the PMA index in the Control group indicates that in the "healthy children" group, PMA index values of more than 10 are rare. Also, the severity of inflammation in the

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gum tissue according to the Schiller Pisarev test was higher in children and adolescents suffering from bronchial asthma.

CONCLUSION

During the clinical examination of the main group, changes in the mucous membrane of the oral cavity and the red border of the lips were diagnosed, while the frequency of pathology of the oral mucosa in this contingent was significantly higher than in the control group. So, in the Main group, lesions of the oral mucosa and the red border of the lips were determined in 58.9% of cases, in the Control group - in 8.2% of cases.

Also, during the clinical examination of the main group, chronic catarrhal stomatitis was detected in 54.62% of cases; in the latter case, congestive hyperemia or cyanosis of the oral mucosa was observed against the background of a decrease in its turgor. At the same time, single petechial rashes were often (76.4%). Examination of the tongue in 42.27% of cases revealed a picture of desquamative glossitis, in 6.4% of cases - atrophy of filiform and mushroom papillae. The tongue was edematous (25.1%), teeth imprints were noted on the lateral surfaces. The red border of the lips was often (51.8%) dry, with a folded relief, small scales and cracks were detected on its surface.

Angular cheilitis was observed in 11.9%, while the corners of the mouth were hyperemic with painful cracks.

Thus, in children and adolescents from the Main group, there is a high frequency of dentoalveolar anomalies, averaging 26.1% in the period of early mixed dentition (6-9 years), 40.5% in the period of late mixed dentition (10-13 years), 33.3% at the stage of the final formation of dentition (14-18) years. At the same time, crowding of the teeth, narrowing of the jaws, distal occlusion, and deep incisal disocclusion prevail in the structure of the dentoalveolar anomaly.

Also, the main group has a high prevalence and intensity of dental caries, inflammatory changes in periodontal tissues, diseases of the oral mucosa and red border of the lip.

Based on the analysis of the results obtained, it is possible to determine the need for an in-depth study of the problem in order to develop rational therapeutic and prophylactic measures in the complex orthodontic treatment of children with bronchial asthma, taking into account the dental status and the underlying disease.

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