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The prevalence of systemic hypoplasia in children depending on the adverse environmental conditions and their prevention

Kamilov Khaydar Pozilovich.,
Taylakova Dildora Ibragimovna.,
Kasymov Mirxodi Mirsoatovich.
Tashkent State Dental Institute Bukhara State Medical Institute named after Abu Ali Ibn Sina,

Abstract The protection of children's health is a priority of the state policy of our republic. A clear evidence of this is the implementation №UP-5590 on 07/12/2018, “Comprehensive measures to fundamentally improve the Public health care system of the Republic of Uzbekistan”, which formulated specific tasks for a number of targeted national programs to strengthen the reproductive health of the population and protect the health of mother and child. At present, this state task has acquired a special significance in connection with the unfavorable environmental situation that has developed in certain regions of the republic.

The deterioration of the environmental situation in the republic is primarily due to the pollution of environmental objects in cotton-growing areas with pesticides and mineral fertilizers, and in industrial zones with a complex of various harmful substances. In some cotton-growing areas there is a combined pollution of environmental objects with pesticides and industrial wastes. An example of this is the pollution of the Karaulbazar district of the Bukhara region with pesticides and harmful emissions from the Bukhara oil-processing plant (BOPP), which significantly aggravates the ecological situation in the region.

Hypoplasia of the teeth (Latin hypoplasia from the ancient Greek. Gsho "prefix with the value of weakened quality" and tskaash - "formation") is a developmental defect consisting in the underdevelopment of the tooth or its tissues. Hypoplasia of the teeth occurs due to the impact of adverse environmental factors on the child's body in uterus and during the first years of life.

In the domestic literature to describe this disease, the term "systemic enamel hypoplasia" is adopted, in the European literature the term "molar-incisive hypomineralization" is used, which implies a failure of systemic hypoplasia of molars and incisors.

The lack of such data makes it impossible to effectively conduct scientifically grounded treatment-and-prophylactic measures and organize rational dental care for the children's population of the republic, which determined the need to perform this work.

Key words: pesticides; dioxides; environmental pollution; tooth hypoplasia; children; prevention

The protection of children's health is a priority of the state policy of our republic. A clear evidence of this is the implementation №UP-5590 on 07/12/2018,

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"Comprehensive measures to fundamentally improve the Public health care system of the Republic of Uzbekistan", which formulated specific tasks for a number of targeted national programs to strengthen the reproductive health of the population and protect the health of mother and child. At present, this state task has acquired a special significance in connection with the unfavorable environmental situation that has developed in certain regions of the republic.

It has been established that among children from cotton and industrial areas whose environmental objects are contaminated with pesticides and industrial emissions, there is a high incidence of diseases of the endocrine, respiratory and nervous systems, organs of the gastrointestinal tract, allergic diseases, physical and intellectual development and congenital malformations. [1,2] However, there are practically no studies in the republic concerning the hypoplasia of the children's teeth in conditions of isolated and combined effects on the body of pesticides, mineral fertilizers and other industrial chemical emissions (sulfur and nitrogen dioxide, ammonia, etc.), the toxic effect of which may be enhanced against the background of high temperature of atmospheric air.

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This disease has been known since immemorial time. During the excavations of the Andronovo culture of Altai, it was found that enamel hypoplasia, often weakly or moderately pronounced, is characteristic of most individuals of the Andronovo sample. Scientists have attributed the emergence of linear enamel hypoplasia with the impact of adverse environmental factors (protein and vitamin deficiencies, acute infectious diseases) that affect the body in childhood, during the formation of crowns of permanent teeth [3]. The symptom results from the interruption of growth processes. It can be assumed that the presence of many Andronovs, as a rule, not pronounced multiple enamel hypoplasia reflects the impact of physiological stress due to seasonal fluctuations in the supply of food resources [3].

An archaeological study of the ancient city of Macho Picchu in Peru indicates the manifestation of a similar form of enamel hypoplasia among the population of the ancient Incas. Scientists attribute the occurrence of this pathology in people of that time with the influence of dietary and environmental factors [4].

The study of the ancient population of the Armenian Highlands (I century BC - III century AD) according to anthropology showed the presence of enamel hypoplasia. According to anthropological scientists, enamel hypoplasia is a developmental defect that manifests itself in a violation of its structure and is caused by insufficient or delayed function of enameloblasts. A change in their function occurs as a result of the disruption of the activity of the parathyroid glands, which occurs in diseases such as syphilis, measles, scarlet fever, rickets, etc. [5].

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The lack of such data makes it impossible to effectively conduct scientifically grounded treatment-and-prophylactic measures and organize rational dental care for the children's population of the republic, which determined the need to perform this dissertation work.

Purpose of the work is to study the prevalence of systemic hypoplasia of the teeth of the child population in various districts of the Bukhara region depending on the degree of environmental pollution, and on this basis, conducting methods of treatment and preventive measures.

Materials and methods. The object of our study were children suffering from systemic enamel hypoplasia, at the age of 7-15 years old, in three districts of the Bukhara region. Those are Karaulbazar district (Multi-Profile Karaulbazar District Polyclinic), Gizhduvan district (School 21), Bukhara (Bukhara Regional Children's Dental Polyclinic). Over the past 9 years there has been a deterioration of the ecological portrait. This is due to the increase in the number of industrial centers. The deterioration of the environmental situation inevitably affects people's health.

Due to the different frequency of occurrence of systemic hypoplasia in children aged 7 to 15 years, two groups were formed. The first group of the Karaulbazar district of 100 children included n = 48 children with a removable bite at the age of 7 to 12, Gizhduvan district of 96 children, n = 31 and Bukhara Madaniyat settlement) of 100, n = 28. In the second Karaulbazar district n = 16– children, Gizhduvan district n = 19, Bukhara (Madaniyat settlement) n = 2 with a constant bite from 13 to 15 years. It turned out that systemic enamel hypoplasia occurs 3 times more often in children aged 7–12 years old — 48% than at the age of 13–15 years old — 16% in Karaulbazar, Gizhduvan 32% in children 7–12 years old, 19.8% at the age of 13–15, this is 1.5 times more often and Bukhara (Madaniyat village) 28% in children 7–12 years old, 2% at the age of 13–15 years .
Research results and discussion In total, 296 children were examined, of them 22 children aged 13–15 years old, 7 children aged 7–12 years old of Karaulbazar district, Gizhduvan district aged 13–15 years 41 children, at the age of 7–12 years old 55 children, Bukhara (Madaniyat settlement) at the age of 13–15 years 29 children, at the age of 7–12 years 71 children. Systemic enamel hypoplasia of permanent teeth was found in 144 (48.6%) children. Of these, at the age of 13–15 years, 37 people (25.6%), and at the age of 7–12 years, 107 people (71.8%). It should be noted that patients whose parents did not live in three districts of the Bukhara region before the birth of a child were not included in the study.

Differences between boys and girls as a percentage of the incidence of 144 children with systemic hypoplasia of the permanent teeth of the Karaulbazar region: 22.9% girls and 21.5% boys are aged, Gijduvan district 15.2% girls and

19.4% boys, Bukhara (Madaniyat settlement) 11.8% girls and 9.02% boys. Differences between boys and girls as a percentage of the incidence of systemic hypoplasia of permanent teeth in the first group of the Karaulbazar region: from 64 children, 43.7% girls and 29.7% boys, Gizhduvan district of 50 children, 34.0% girls and 28% boys, Bukhara (Madaniyat settlement) out of 30 children, 50% girls and 40% boys aged 7-12 years. In the second groups there were insignificant, except for the boys of the Gizhduvan region: Karaulbazar district, 14.1 girls and 12.5% boys, Gizhduvan district 10.0% girls and 28% boys, Bukhara (Madaniyat village) 3% girls and 7% for boys age 13-15 years.

We carried out a questionnaire (screening) examination of the mouth of schoolchildren living in the survey areas in order to determine the effectiveness of this method in identifying the influence of adverse environmental factors on dentition**.**

Analysis of the data obtained from interviewing children in rural areas has shown (app) that in the experimental area the largest number of children (82.0%) complained of periodic (especially in summer) unpleasant odors from the oil-processing plant, whereas in the control areas there were almost no such complaints. 80.0% of children in the Karaulbazar region pointed out the feeling of unpleasant smells during the period of processing the fields with pesticides and mineral fertilizers, in Gijduvan 56.0%, in Bukhara, 22.0%, of which 50.0% of children in Karaulbazar, 24.0% in Gijduvan, and 14% in Bukhara districts limited the ventilation of rooms due to unpleasant odor.

Complaints of headaches, nausea, cough, lacrimation associated with the presence of unpleasant odors in the air, were presented by children of the experimental area 1.3 and 7.8 times more often than in the two control areas.

Questionnaire interviewing has shown that the diseases that have been experienced, a level of hygienic knowledge of oral care and nutrition in children in the studied rural areas, in the Karaulbazar district, out of 100 children surveyed, 49% observed a diet; in Gizhduvan, out of 96 children, 62%, Bukhara (Madaniyat settlement) out of 100 children, 80%. Attention is paid to hygienic oral care in the Karaulbazar region, 31%, in the Gizhduvan region, 46%, in Bukhara (Madaniyat village), 65%.

It has been established that due to poor hygienic care and non-compliance with the diet in the Karaulbazar district, children are significantly more likely to complain compared to control information for dull aches in the teeth from chemical and temporal stimuli 24.0%, acute throbbing, night pains 25.0%, dull, during chewing and pressing on the tooth 31.0% are characteristic pains for caries, pulpitis and periodontitis of teeth. To change the color in the teeth - white spot 40.8%, yellow 16.7% and brown spots in the teeth 26.2% - characteristic systemic hypoplasia of the teeth, caries, pulpitis and periodontitis of the teeth, in the Gizhduvan district, complaints of dull aches in the teeth from chemical and temporal stimuli 17.0%, acute throbbing, night pains 19.0%, dull, with chewing and pressing on the tooth 23.0%- an increased percentage is characteristic pain for

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pulpitis and periodontitis of teeth. To change the color in the teeth - white spot 33.6%, yellow 16.8% and brown spots in the teeth 15.0%. In Bukhara -23.3% for systemic hypoplasia and dental caries in the staining stage, 10.0% complaints about night pains and 18.3% complaints when chewing and pressing on a tooth. On the white spot in the teeth, 15.2%, yellow 9.1% and brown spots make up 6.1%. These data indicate the highest frequency of systemic tooth hypoplasia in the Karaulbazar region.

In addition, in the experimental area, the presence of cavities in the teeth of 56% was significantly more often observed. In the Gizhduvan district, these changes in the teeth in children were observed to be significantly more often 31% than in the Bukhara district 15%.

In the survey it was also revealed that a significant number of children in the experimental area complained of discoloration of the teeth (staining the teeth in yellow and brown), bleeding gums, bad breath, pain, itching and burning in the gums, indicating the presence of inflammatory processes - gingivitis and periodontitis; signs characteristic of parodontosis are noted bad breath, pain, itching and burning in the gums, indicating the presence of inflammatory processes - gingivitis and periodontitis; signs characteristic of parodontosis (shakiness and tooth sensitivity) 2.9 times more often than in the control area; revealed complaints of dry mouth, a feeling of bitterness on the tongue, a violation of taste, the presence of pain, burning of periodically occurring sores and erosions in different parts of the oral cavity, pain, itching, burning and the presence of crusts and cracks on the lips, characteristic of stomatitis, glossitis and cheilitis (7.8-14.9%). Similar complaints in the Gizhduvan district amounted to 4.7-7.2%, in Bukhara 1.2-2.7%.

Conducted clinical and experimental studies have established (Chapter 4) that in the occurrence and development of dental diseases in children and laboratory animals under the conditions of exposure to pesticides and industrial emissions of BNPP, the general toxic (resorptive) and local (contact) effects of these harmful substances on the body play a certain role, which cause changes in the general condition and clinical and functional parameters in the oral cavity.

Therefore, the treatment of these diseases should be complex, including the elimination of general and local effects, first of all, the general toxic action of harmful substances, as well as the normalization of metabolic processes in the body and the ESD

As is known, at present there is a large arsenal of means and methods for the treatment and prevention of intoxication of the body with pesticides and other chemicals. [9,10]. However, analysis of literature data in recent years has show [10,11], However, analysis of the literature of recent years has shown that the use of ascorbic acid is the most promising in terms of the greater pathogenetic effect on the body during exposure to chlorine and organophosphate pesticides, and calcium and glycerophosphate combined with ascorbic acid when intoxicated with sulfur dioxide and nitrogen acid.

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Based on these observations and relying on the data of our own field and experimental studies, we have developed a set of therapeutic and preventive measures,including total calcium glycerophosphate and ascorbic acid inside and local (oral irrigation with SPLAT Professional rinse agent "Forest herbs" and "Biocalcium" and tooth brushing with "SPLAT Biocalcium" and "SPLAT JUNIOR" pastes) effect (GAE complex).

The use of ascorbic acid and calcium glycerophosphate is due to the fact that they activate the redox processes in the body,

It has a positive effect on metabolic processes and morphofunctional parameters in the tissues, on the metabolically important parts of carbon, protein, lipid and, most importantly, energy exchanges, thereby speeding up the excretion of harmful chemicals from the body [9,11].

The feasibility of incorporating the new drug "SPLAT Biocalcium", "SPLAT JUNIOR") into the developed by us therapeutic and prophylactic complex of the company Professional oral care is determined by the following components [12,13]:

- chlorhexidine has a wide spectrum of bactericidal action against gram-positive and gram-negative microbial flora, thereby destroying the bacterial plaque,mineralization of which leads to the formation of tartar;

sodium citrate is a substance that binds calcium in a soft tooth and thus prevents mineralization of the latter;

sodium borate gives the teeth a natural color, due to the removal of brown spots that occur when excessive consumption of coffee and cigarettes;

dimethicone is a gel-like substance that covers the teeth with a protective film, prevents the deposition of soft plaque and prevents the formation of tartar.

The clinical effectiveness of rinsing the mouth with a SPLAT Professional "Forest Herbs" and "Biocalcium" rinse is due to the formation of a protective film on the teeth and gingival mucosa and thus a warning against the harmful effects of acidic plaque and toxic drugs in the mouth, falling from the environment.

In this regard, a study was undertaken of the effectiveness of the use of calcium glycerophosphate and ascorbic acid in the complex treatment of systemic tooth hypoplasia in children of the Karaulbazar, Gizhduvan districts and Bukhara (Madaniyat village).

The methodology of these events was as follows.

The application of teeth. After brushing your teeth with toothpaste, your teeth are laid with tampons moistened with 10% calcium gluconate solution for 3-5 minutes,then for 5-6 minutes - rollers moistened with the SPLAT Professional rinse agent "Forest herbs" and "Biocalcium".For one course, 3-6 procedures were performed every other day, 3-4 times a year.

Rinse the mouth. After brushing your teeth with "SPLAT Biocalcium" and "SPLAT JUNIOR" pastes, the mouth rinsing of SPLAT Professional "Forest Herbs" and "Biocalcium" was performed for 3-5 minutes. The course was prescribed 8-10 procedures.After rinsing for 2 hours, children were not

recommended to eat and brush their teeth. Such courses were repeated 3-5 times a year.

Observations were performed on two groups of patients with systemic tooth hypoplasia in children aged 7–15 years. Both groups of children received comprehensive treatment with the inclusion of local and general activities.General treatment was prescribed depending on the general condition of the body of sick children after consulting with pediatricians.

Patients of the first group of 82 children (experimental group) received calcium glycerophosphate (1 tablet 3 times a day), ascorbic acid (1 tablet 3 times a day) and the mineral preparation “Oligovit” (1 tablet per day) during the entire course of treatment.Topical treatment consisted of thorough removal of dental deposits, treatment of carious teeth, two-time controlled toothbrushing with the “SPLAT Biocalcium” and “SPLAT JUNIOR” pastes, 2-3 single irrigations and the application of gums with the SPLAT “Biocalcium” rinse.

The second group of patients from 62 children (the control group) also received calcium glycerol phosphate (1 tablet 3 times a day), ascorbic acid (1 tablet 3 times a day) and Oligovit (1 tablet per day), and locally they had the generally accepted traditional treatment:removal of dental plaque, treatment of carious teeth, twice cleaning the teeth with the famous paste “SPLAT Biocalcium”, “SPLAT JUNIOR”) and antiseptic treatment of gums with hydrogen peroxide solution (1%).

The duration of one course of treatment for both groups of patients was 15–20 sessions.

The condition of the teeth and oral tissues in children of the main and control groups was determined before and after the course of complex therapy.

The effectiveness of the treatment of patients was assessed by changes in subjective sensations, clinical symptoms, data hygienic index (state of hygienic care of the oral cavity), acid solubility of tooth enamel.

Thus, the use of the proposed treatment-and-prophylactic complex (the experimental group of patients) led to a significant decrease in the hygienic index of the oral cavity (by 3.5 points), acid solubility of the tooth enamel (by 39.3).The clinical recovery of patients (improvement of well-being, the disappearance of pain, etc.) occurred on average at 7 ± 0.18 days of treatment.

At the same time, in patients of the control group who received traditional treatment, the hygienic index of the oral cavity after treatment decreased by only 1.3 points, the solubility of tooth enamel by 12.6%.

As for the oral cavity immunity in this group of sick children, although the treatment process showed a tendency to activate it, there were no significant differences in the studied parameters before and after treatment ($P > 0.05$).The normalization of the clinical symptoms of patients occurred on average at 11 ± 0.26 days of treatment, which is 4 ± 0.12 days later than in the experimental group of patients.

Thus, the results of the studies indicate a significant efficacy of topical use of drugs "SPLAT"in the form of irrigation (mouth rinses) of the oral cavity and

tooth brushing in the complex treatment of gingivitis compared with conventional traditional methods of treatment.Allergic reactions and side effects of these funds did not cause.

Summarizing the data on the features of prevention and treatment of dental diseases in children, we can conclude that to prevent and treat lesions of hard dental tissues in children in terms of the impact on the body of adverse environmental factors, the complex of therapeutic and prophylactic effects (general and local) recommended by us, with the inclusion of calcium glycerophosphate preparations, has significant positive efficacy, ascorbic acid, "Oligovit" and "SPLAT", as the most environmentally friendly and harmless therapeutic and prophylactic agents.

Findings:

1. Intrauterine exposure to ecotoxic factors (pesticides and sulfur dioxide and nitrogen) leads to impaired embryonic and postnatal development of offspring, which manifest themselves to the maximum extent during combined intoxication with pesticides and dioxides.

2. The prevalence of systemic hypoplasia of tooth enamel among children 7–15 years old in three districts of the Bukhara region is 48.6%. Of these, at the age of 13–15 years, 37 people (25.6%), and at the age of 7–12 years, 107 people (71.8%). At the same time, enamel hypoplasia in children of 7-12 years old is almost 3 times higher than at the age of 13-15 years.

3. The main pathogenetic prerequisites for the growth of systemic tooth hypoplasia among children in ecologically unfavorable areas are functional impairments in their bodies, manifested in the form of a decrease in resistance of hard dental tissues.

4. The most priority measure in the prevention and treatment of tooth hypoplasia in children is the use of “SPLAT Biocalcium”, “SPLAT JUNIOR” toothpaste and SPLAT “Forest Herbs” conditioner, directed action and simultaneous oral administration of calcium glycerophosphate, ascorbic acid and oligovitis, experimentally - clinical approbation of which showed high efficiency.

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