MINISTRY OF HEALTH OF THE REPUBLIC OF UZBEKISTAN

TASHKENT STATE DENTAL INSTITUTE

DINIKULOV ZHURABEK ABDUNABIEVICH

ENDOGENOUS PREVENTION OF DENTAL CARIES IN CHILDREN

MONOGRAPH

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ENDOGENOUS PREVENTION OF DENTAL CARIES IN PRESCHOOL CHILDREN

(MONOGRAPH)

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The monograph is based on the analysis of the results of our own research, the effects of caries preventive measures with the addition of iodized fluorinated table salt on the dental status of preschool children are studied.

The monograph is intended for dentists and specialists dealing with the problem of caries in children.

INTRODUCTION

In the modern world , among the factors influencing the prevalence and intensity of dental caries, coordination of the optimal concentration of fluoride in the child's body, especially during the period of tooth formation, is of great importance. The widespread use of fluoride-containing products as one of the main methods of caries prevention is becoming increasingly popular today. The study of the effectiveness of fluorides in the fight against caries has been going on for 70 years, and during this time, a great deal of scientific and practical experience has been accumulated. As a result of the practical application of the accumulated experience, certain results have been achieved. The effective action of fluorides against demineralization and caries is confirmed by various observations and a high level of scientific evidence, numerous randomized clinical trials. These facts are consistent with the thesis that "...systemic methods of fluoride prophylaxis: water, salt, fluoridated milk and, in general, the effectiveness and safety of taking liquids and solutions containing fluoride, allows for significantly higher (40-60%) results in the fight against caries at low cost...". [1]Today , optimization of diagnostics of various diseases of the oral cavity in preschool educational institutions, reduction of their complications and improvement of the mechanism of preventive measures - one of the pressing problems of modern dentistry that needs to be solved.

in various medical schools around the world to improve endogenous prevention of dental caries in organized children's groups. In this regard, it is necessary to analyze the dental status of preschool children living in the selected area, the concentration of fluoride in drinking water, the physicochemical properties of oral fluid of children living in the selected area, analyze the mineral composition of foods in the children's diet and ensure the standard level, conducting scientific research aimed at developing a set of measures to prevent dental caries and assessing its effectiveness by including iodized-fluorinated salt in the daily diet is of particular importance [4. - P. 66-68].

[1]Staun Larsen L., Baelum V., Tenuta L.M.A. Fluoride in saliva and dental biofilm after 1500 and 5000 ppm fluoride exposure //Clin Oral Investig. 2017 Sep 1. doi : 10.1007/ s 00784-017-2195

The development of the medical industry in our country, the adaptation of the medical system to the requirements of world standards, including measures aimed at early diagnosis and effective treatment of dental diseases, are under the constant attention of industry officials. In this regard, in accordance with the seven priority areas of the development strategy of New Uzbekistan for 2022-2026, such tasks as "... improving the quality of qualified services to the population in the primary health care service ..." [2]are defined in raising the level of medical care for the population to a new level. Based on these tasks, there is a need to conduct a number of scientific studies in order to improve the endogenous prevention of dental caries in organized children's groups.

[2]Decree of the President of the Republic of Uzbekistan dated January 28, 2022 No. PF-60 "On the Development Strategy of the New Uzbekistan for 2022-2026".

Etiology and pathogenesis of dental caries in children

Childhood caries is one of the important tasks in pediatric dentistry. Caries is widespread throughout the world. Despite a noticeable decrease in the growth of dental caries among young children in a number of countries, including Uzbekistan, these figures remain high. In conducting a number of studies, many authors have established that the prevalence and intensity of caries among young children is higher than among school-age children. The reason was the action of unfavorable factors during the antenatal period of the child's life, as well as the low resistance of the enamel of temporary teeth. [16; - P. 31-34.].

According to WHO data, the Republic of Uzbekistan belongs to the region with a high prevalence of caries. Data from epidemiological studies conducted in recent years have shown that the high prevalence of dental caries in the country, especially among children, is associated with a number of social and medical and sanitary reasons. The authors found that in the republic, children living in cities have a higher incidence of caries, amounting to 87.76% with an intensity of 3.96, while in children living in rural areas, it is 80.91% with an intensity of 3.3. 3 [16; - P. 31-34].

According to modern concepts of the etiology and pathogenesis of caries, the disease is considered multifactorial. In its formation and development, hereditary, congenital and acquired factors play a significant role, as well as irrational nutrition, low fluoride content in drinking water, the presence of general diseases, changes in the functional state of organs and systems during the formation and maturation of dental tissues, the impact of unfavorable environmental factors, etc., are of particular importance. Local cariogenic factors also play an important role. Factors that contribute to increased dental caries resistance in children: dental plaque, abnormal composition and properties of oral fluid, sticky carbohydrate food residues, condition of the dental pulp, condition of the dental system during the period of formation, development and eruption of pePMAnent teeth. [29. - №2; 34. – P.744.; 30. –P. 53-56.; 31. -P.231.; 32. –P.270.; 51. –P. 464.]

When the dental system develops caries, primary teeth are primarily affected by malformations of hard dental tissues: hypoplasia, dysplasia, which occurs during pregnancy and childbirth. The rate of spread of caries in children is high, primarily due to the low degree of mineralization of hard tissues of primary teeth. Complications can develop within several months after the first signs of the disease are detected [16. -P. 31-34.].

The study of the etiology of the occurrence of dental caries considers the diversity of various risk factors, the interaction of which led to the appearance of a demineralization focus. Some of the important risk factors for the development of caries in children are: diet, residues of carbonaceous sticky food in the mouth, oral microflora, plaque, disturbance of the qualitative and quantitative composition and properties of saliva, incomplete structure of hard dental tissues, and the general condition of the child's body itself. According to the authors, an important role in dental caries resistance is played by the incomplete structure and development of enamel, namely: a violation of the chemical composition and genetically determined features. The rate of development and course of caries largely depends on the rate of demineralization and remineralization processes of the surface layer of enamel [6. – P. 304.; 37. – P. 416.].

Incomplete process of mineralization of hard tissues of pePMAnent teeth at an age is a factor of increased risk of occurrence of caries in early childhood. Consequently, development of caries in children of early age is promoted by violation of structure of dental tissues, which arose in a child still in the womb [35. -P.39-42; 60. -P.8-9.; 61. -P.3-10.; 64. -P.71-73.].

The resistance of the surface layer to caries plays an important role in the formation and development of dental caries, and it largely depends on such factors as: the intensity of tooth enamel fluoride, the anatomical structure of the enamel, proper oral hygiene, as well as the diet, since carbohydrate foods provoke the appearance of plaque [29. - No. 2; 34. - P. 744.; 42. - P. 636.; 51. - P. 464.]. The general condition of the body and the content of saliva are also influenced by the optimal intake of vitamins. A decrease in saliva secretion promotes active growth and attachment of microorganisms to the "pellicle", which increases the rate of

caries development. Due to the buffering properties of saliva, acids and alkalis are neutralized, so it plays an important role in the resistance of teeth to corrosion. It has been proven that long-term intake of carbohydrates reduces the amount of saliva secretion, which leads to a decrease in the buffer capacity and greater preservation of the pH value of the biological film of the tooth in an acidic environment, which contributes to a significant increase in the risk of developing caries, and the intake of high-protein foods increases the buffer capacity, thereby being a factor that increases the resistance of teeth to caries [42. – P. 636; 34. – C.744.; 29. - No. 2; 51. –C. 464.].

During pregnancy, various changes occur in the mother's body, which can play an important role in the development and laying of dental rudiments. During pregnancy, women's saliva composition and quantity change, which reduces its protective properties, and calcium decreases, which leads to the surface of the teeth becoming vulnerable to bacteria "responsible" for the development of caries. The number of Streptococcus mutans in the mother's oral cavity directly affects its number in the child's oral cavity; a decrease in the number of Streptococcus mutans in the mother's oral cavity delays their colonization of the child's oral cavity [85].

A number of studies have shown that among children infected with Streptococcus mutans, by the age of 3, more than 50% suffer from dental caries , while in those not infected, caries occurs in 3% of cases [30. - No. 2; 35. –P. 744.; 52. –P. 464.]. Children whose dental plaque contained S. mutans already at the age of 2 suffered from active forms of caries by the age of 4 and had a high level of KPU+kp> 10.6, whereas in children in whom colonization occurred much later, the KPU+kp index varied within the range of 3.4 [68]. According to modern sources, the average age of infection is 1.5 years, and by this time more than 80% of children have a high level of S. mutans in the oral cavity.

In older children, caries can occur due to excessive consumption of carbohydrates, poor oral hygiene, insufficient intake of minerals and microelements, vitamins, etc. [35. -P.39-42; 60. -P. 8-9.; 62. -P. 3-10.; 64. -P.71-73.].

It has been established that due to their deficiency in the body, caries of temporary teeth occurs and steadily progresses from early childhood and, as a consequence, the number of severe complications increases.

According to the results of studies by a number of authors aimed at studying the growth of dental caries development, it was proven that caries mainly affects chewing teeth in both deciduous and pePMAnent occlusion. S. Bjarnasson established that with caries of deciduous teeth, 89% of the affected teeth are molars. There is also information about the predominant lesion of fissures of the lower molars in children aged 3-4 years [69. – P.28.]. According to literature data, in young children more than 90% of carious cavities are localized on the chewing surface of primary molars [16]. According to other researchers, this figure is 86% [88. -P.3.].

During clinical studies, it was found that by the age of 7 years, children experience a sharp increase in the development of caries of pePMAnent teeth and, according to various authors, tooth decay at this age occurs in 42-60%, and the KPU varies within the range of 0.67-1.5 [22. -P. 23.; 26. -P. 10.; 49. -P.19-20.; 50. -P. 21.;].

The destruction of enamel occurs mainly due to the influence of various acids that are formed during the active fermentation of carbohydrates. It should be noted that the rate of fermentation in plaque is affected by both the quantity and quality of carbohydrates in the oral cavity: sucrose fermentation is the most intense, while fructose and glucose fermentation is less intense. Starch in its pure form, being a polysaccharide, is not cariogenic, since its molecules do not penetrate plaque, but its structure is destroyed during its processing, which completely changes its effect on the tooth - increases cariogenicity. Sorbites and mannitols also have the ability to penetrate plaque, but do not affect the cariogenicity of the tooth, due to the low activity of enzymes that convert them into fructose [29. - No. 2; 34. - P. 744.; 42. - P. 636.; 51. - P. 464.].

Many products that children love, including milk formulas, contain large amounts of easily fermentable carbohydrates, especially lactose. And it was established that the higher the consumption of carbohydrates, the greater the

number of Lactobacilla, and S. mutans, entering into symbiosis with them, form extracellular polysaccharides, which contributes to an increase in the stability of the plaque matrix.

According to WHO recommendations, the daily diet of children should not exceed 10 percent of energy, excessive consumption of carbohydrates is a risk factor for the development of caries, thus, in 5-6-year-old children who consumed sugar 2 times higher than the established norm, the level of caries intensity increases from 8 to 15 [27. - P.89 - 93.].

The probability of caries occurrence directly depends on the acids acting on the surface of the teeth, which are formed by microorganisms of the oral cavity after the consumption of carbohydrate foods. After a certain time, these acids are neutralized by the buffering properties of saliva and demineralized enamel, after each cycle of interaction of acids with the surface of the tooth, inorganic minerals of the enamel dissolve. High consumption of carbohydrates throughout the day leads to a decrease in pH in the oral cavity and long-term maintenance of this indicator, which leads to an increase in the likelihood of irreversible destruction of the enamel surface [29. - No. 2; 34. –P. 744.; 42. –P. 636.; 51. –P. 464.].

The cariogenic situation in the oral cavity is characterized by the following clinical signs: poor oral hygiene, various bite anomalies, crowded teeth, low salivary secretion rate, high saliva viscosity, decreased mineral content in saliva, etc.

The structural properties of saliva, determined by the quantitative and qualitative characteristics of salivary micelles, can play a significant role not only in maintaining homeostasis in the oral cavity, but also in preserving the enamel surface and successfully resisting the so-called carious attack [6. – P. 304.; 65. - P. 5-8.]. The properties of saliva are determined by the content of macro- and the degree of its saturation with their ions, as well as microelements and pH values of the environment. NoPMAlly, at pH 6.5-7.5, saliva is oversaturated with calcium and phosphorus ions in the form of hydroxyapatite. A decrease in pH values of the environment is accompanied by a decrease in the saturation of saliva with macro- and microelements and hydroxyapatite [65. - P. 5-8.; 66. -P.7-11.].

Basic postulates of the concept of pathogenesis of dental caries

According to modern research on the physiological structure of hard dental tissues, the biochemical and morphological composition of carious lesions, as well as their interaction with saliva components, the formation and development of caries occurs as follows: Pellicle - an organic film of enamel formed from glycoproteins of saliva, and when exposed to bacteria of noPMAl microflora with it, a bacterial mass, plaque, is formed. Sugars that enter the body with food, under the influence of plaque bacteria, are converted by glycolysis into weak organic acids, which, diffusing through the plaque into the tooth cavity, wash out a large amount of calcium and phosphorus from the enamel, causing destruction of tooth tissue [34. – P. 744.; 42. – P. 636.].

The formation of carious destruction is a long process, lasting months, even years. As a result of the intake of food containing a large amount of carbohydrates, bicarbonates, buffers of oral fluid, between periods of acid formation, differentiate into plaque and neutralize the acids present, which entails the leaching of a large volume of calcium and phosphorus from the body [29. - No. 2; 51. - P. 464.].

Initial carious demineralization of enamel is fundamentally described as acidic dissolution of apatite in the process of two main sequential chemical reactions:

$Ca_{10}(PO_4)_6(OH)_2 + 2H_3^+O \leftrightarrow Ca_{10}(H_3O)_2(PO_4)_6(OH)_2$

$Ca_{10}(PO_4)_6 + 8H^+ \rightarrow 10Ca^{2+} + 6\ HPO_4^{2+} + 2H_2O$ [42. –C. 636.; 51. –C. 464.]

The process of demineralization is natural and reversible. The predominance of one of the processes – dissolution of apatites or precipitation of calcium back into apatite – depends on two main factors: acidity and the concentration of calcium ions in the environment surrounding the tooth. [42. –P. 636.]

Under certain conditions (excess sugar in the diet, unhygienic contents of the oral cavity, etc.) in a limited area of the surface or in the folds of the tooth enamel in dental plaque of a day or more ago, the pH decreases to a critical level, which is maintained for a long time or has an intermittent character. Microorganisms of dental plaque firmly settle on the surface of the tooth and as a

result of enzymatic processes lyse the protective organic shell of the tooth – the pellicle. In this way, the possibility of direct contact of acids formed in dental plaque with mineral substances of enamel is created. [4 2. – P. 636.; 51. – P. 464.]

The carious process progresses if the rate of salivation decreases, the amount of saliva decreases, and its viscosity increases. The disease can slow down or stop at the spot stage when salivation is noPMAlized.

The rapid development of caries is facilitated by the low fluoride content and high carbonate content in the enamel. [42. –P. 636.; 51. –P. 464.]

Demineralization of teeth is a natural and reversible process of destruction of tooth enamel due to loss of minerals, especially calcium, on which the integrity and strength of hard dental tissues depend. The predominance of one of the processes - dissolution of apatites or precipitation of calcium back into the tissue - depends on two main factors: acidity and concentration of calcium ions in the environment surrounding the tooth [42. - P. 636].

With unsanitary oral hygiene, excessive consumption of carbohydrate-containing products, low calcium content in the hard tissues of the tooth, the pH in the enamel folds decreases to a critical level, which leads to the deposition of plaque microorganisms on the surface of the tooth, as a result of which enzymatic processes lyse the protective shell of the tooth - the pellicle. As a result, the possibility of direct contact between plaque acids and enamel minerals is created [42. – P. 636.; 51. – P. 464.].

As has been established, the cause of the carious process are microorganisms, but a number of factors influence its development, including saliva, a biological fluid that performs a number of important functions. The rate of salivation significantly affects the progression of the carious process: when salivation decreases, the amount of saliva decreases and its viscosity increases. The active development of caries is also influenced by low fluoride content and high carbonate content in enamel [42. – P. 636.; 51. – P. 464.].

The importance of fluorides in the prevention of dental caries among children.

The first studies of the effects of fluorides were conducted back in the 1930s, when its importance and close connection with the growth of dental caries were noted: the higher its concentration in natural water sources and in food consumed, the lower the risk of developing caries. These studies served as a step towards the artificial introduction of fluoride into drinking water. Fluoridation is the safest, most cost-effective measure for preventing dental caries, which has proven to be highly effective in studies [102. -P.451-462].

Studies conducted over the past decades have shown the effectiveness of fluorides in combating the growth of caries, and it is used both locally and systemically [7].

Fluorine plays an important role in many biological processes of the body, and when studying its metabolism in the human body, it was found that 99% of all fluorine in the body is found in mineralized tissues, since it has a selective property for minerals of teeth and bones [7]. Fluorine takes direct part in the process of mineralization of bone and dental tissues [44. –P. 157].

A.A. Zhavoronkov believes that fluoride, concentrated in teeth and bones, stimulates not only the formation of teeth, but also affects the mineralization of teeth [13. - P.59 - 62.].

Fluorine is a part of the tooth germ even before the onset of mineralization processes, due to its high similarity to the enamel matrix proteins, thereby playing a significant role in the formation of apatite crystallization centers - this increases the size of the hydroxyapatites being built, the replacement of the hydroxyl group in them, the formation of a transitional form of apatite to fluorapatite, and the complete replacement of all OH groups. It should also be noted that fluoride not only increases mineralization of hard dental tissues, but also prevents their demineralization [24. - P.330-337.].

Fluorine makes up 0.065% of the elements of the earth's crust and is an important component of biogeochemical processes occurring in the human body. Fluorides enter the human body in various ways: food, medicines, pesticides, and

some even inhale fluoride compounds found in the air, since many industrial enterprises release large quantities of solid products containing fluoride compounds into the environment. It has been proven that the highest absorption of fluoride occurs in dissolved form, that is, together with drinking water. Consumption of water with a fluoride concentration of 1 to 1.2 mg/l results in an adult receiving 2-3 mg of fluoride per day, which reduces the intensity of caries development by 2-4 times [56. –P. 216]. We know that fluoride deposition in hard dental tissues occurs most actively in childhood and adolescence, and in adults this process is less intense, but it also helps to increase the resistance of enamel to caries. It should be noted that fluorides do not have the property of instantly preventing and stopping the development of early caries, but it helps to slow it down, thereby having a beneficial effect on the shape and appearance of teeth, the position and timing of the appearance of teeth in the dental arch, the frequency and severity of periodontal diseases, and teeth are less susceptible to enamel hypoplasia [12. – P. 912].

Formation of fluorides in the composition of apatites occurs not only in the initial period of its formation, but also substitution of hydroxide ions for fluoride ions in already formed minerals in the surface layer of enamel, where its thickness reaches 50 μm, can occur. This process is facilitated by the same radius, charge and degree of hydration of F and OH ions [3. – P. 495].

The orderliness of apatites directly depends on fluorides, and this affects the decrease in solubility and thermodynamic properties of enamel, which facilitates remineralization processes. For noPMAl caries resistance, enamel requires about 20% fluorapatite [58. –P. 38.; 109. -P.826-828.].

Fluorine enters the body in various ways: in the composition of products of plant origin and drinking water, through the gastrointestinal tract, lungs and skin, reaching bone tissue along with the bloodstream. To maintain the noPMAl concentration of fluoride in the body, with its significant decrease, fluoride ions in the bone tissue are transported into the extracellular fluid, thereby causing balancing the amount of fluoride throughout the body [43. –C. 60.].

An increase or decrease in the fluoride content in the body affects the activity of all enzyme complexes involved in the mineralization of bones and teeth. A lack of fluoride reduces the activity of enzymes, which leads to a disruption in calcium metabolism and this contributes to an increase in the susceptibility of teeth to caries and underdevelopment of the musculoskeletal system [93. -P. 257-261], and excess fluoride leads to dental fluorosis, while the activity of enzymes is suppressed and tissue mineralization is disrupted [67. -C.42 -49.; 80. -P. 384-390.; 98. -P. 26-28.; 113. -P.93-98.].

Today, there are many theories about the origin of fluorosis, but the most likely cause is considered to be the consumption of drinking water with an increased content of fluoride, which leads to its increase in saliva and on the surface of the enamel, therefore fluorosis is considered an endemic disease [77. - P.123-129; 94. -P.461-471.].

A.K. Nikolashin, while studying the properties and functions of saliva, noted that when alkaline phosphatase decreases, changes occur that lead to an increase in the permeability of hard dental tissues [45. – P. 46].

The structure of proteins is disrupted, the order of the crystal lattice changes, and calcium fluorides are formed instead of hydroxyapatites [81. - P.439 - 443.].

Ultimately, there is a disruption of all the properties and functions of the enamel cells-ameloblasts, which leads to abnormal formation of enamel: the appearance of chalky and pigment spots, and in the most severe cases, its destruction is observed [4 5. – P. 46.; 25. – P. 464; 104. - P.654.].

The importance of fluoride in the prevention of caries is great: it participates in the mineralization of enamel with fluoride ions not only during the intrauterine period of formation, but also after its eruption, helps to maintain stable homeostasis of dental tissues, suppresses the activity of oral bacteria, thereby reducing the formation of acids in plaque, at initial caries it carries out the reprecipitation of enamel crystals, and fluoride also affects collagen, which in turn affects the cellular metabolism of fibroblasts, chondroblasts, ameloblasts, odontoblasts and osteoblasts [23. - P. 18-22.; 107. - P.742-75].

Having a large store of knowledge in the field of etiology and pathogenesis of dental caries, we better understand the mechanism of the preventive action of fluoride, thus we can help reduce the growth of the development of the intensity of dental caries [38. - P. 321-328].

Fluoride is most effective during the period of development and maturation of teeth, but it must be used throughout life to increase caries resistance, which has been proven by many studies. Fluoride accelerates the deposition of calcium phosphate and the formation of fluorapatites on the enamel surface, facilitating its enrichment with calcium, phosphorus and fluoride ions, thereby increasing the resistance of enamel to the effects of cariogenic factors [40. - P.72-75].

Fluoride also has an antibacterial effect, that is, it reduces the activity of oral bacteria, and this helps suppress the formation of acids in plaque, thereby preventing the formation of dental caries [82; 86. - P. 676 - 681.; 114. - P.166-174.].

The determining factor for oral microorganisms is the suppression of the glycolysis process by fluorine, inactivating enolase, forming insoluble complexes of magnesium, which is its coenzyme. As a result, the process of lactic acid formation by bacteria is interrupted [2 4. - P.330-337.].

The main reason for the occurrence of various pathologies in the oral cavity is the ability of microorganisms to adhere to the enamel surface with the help of polysaccharide cells associated with sucrose.

Oral bacteria synthesize such extracellular polysaccharides as dextran and levan for intensive growth and development of dental plaque, and the effect of fluoride on them prevents their formation and development. Under the influence of fluorides, dental plaque becomes more sluggish and easily removed from the enamel surface, and this proves that all fluoride compounds are good desorbents of dental deposits. Fluoride ions have the property of changing the electrical potential of enamel, thereby counteracting the immersion of albumins, salivary glycoproteins and microbial particles on enamel [71. - P.653 – 659.].

As we already know, a lack of fluoride leads to an increase in the development of dental caries, and an excess has a bacteriostatic, and in large doses even bactericidal effect due to the blocking of enzymes necessary for the vital activity of microorganisms [90. - P.381-396.; 91.].

According to G.D. Ovrutsky, fluorine has a phenomenal anti-caries effect not only due to its mineral-forming and antibacterial properties, but also due to its immunotropic effect on the human body [47. – P. 144.].

The Importance of Fluoride in the Prevention of Dental Caries Among Children

In children, especially during the period of tooth formation, optimal intake of fluoride is necessary, as it is of great importance in preventing the prevalence and intensity of caries. We know that in many areas of Uzbekistan, the fluoride content in drinking water is below the optimal dose established by WHO. Therefore, one of the methods of combating caries among children should be the use of fluoride-containing products.

Numerous studies conducted in recent years have been devoted to studying the effectiveness of fluorides on the human body, and during this period a lot of experience and knowledge about the properties of fluoride has been accumulated, and results have been obtained at the population level. [15. -P.73-76.; 18. -P.131-133.; 28. –P. 45.; 62.-P.47-48.; 70. -P. 138-44.; 74. P. 8-31.; 76.; 97.-P. 34-9.].

In recent years, various methods of preventing dental caries in children and adults have been developed and applied, but over the past 65 years, the main remedy has been fluoride, the methods of application of which are usually divided into local, involving the application of fluoride-containing preparations to the teeth, and systemic, involving the consumption of additional amounts of fluoride internally for protecting teeth from caries both before and after their provocation, that is, by all age groups of the population [55. – P. 13].

As mentioned above, fluoride has become widely known in the prevention of caries. According to research data, it was revealed that by the beginning of the 21st century, more than 230 million people already used fluoridated water, and more than 400 million used fluoridated salt, as well as fluoridated toothpastes to prevent the growth of caries intensity. [54. – P. 83–87.]. However, the attitude towards this practice cannot be called unambiguous: the idea of dental caries prevention and private methods of its implementation have both supporters and opponents at the level of countries, medical communities, doctors and consumers [53. – P. 49–52.].

Despite significant improvements in terms of reducing the prevalence and incidence of dental caries among populations worldwide, problems still persist,

especially among low-income groups in both developed and developing countries. However, results obtained in several countries have demonstrated that dental caries can be effectively prevented by fluoridation programs. Fluoridation of water, salt, milk and the use of affordable fluoridated toothpastes play an important role in public health [91].

The article by the authors [103] of a randomized double-blind crossover study was devoted to the measurement of fluoride in saliva and 7-day biofilm fluid and biofilm after washes three times a day for 3 weeks with fluoride 1500 or 5000 ppm. The background fluoride concentration was statistically significantly higher at 5000 compared to the 1500 ppm rinse group. The scientists concluded that regular exposure to 5000 ppm fluoride increased background fluoride concentrations in saliva, biofilm, and particulate biofilm compared to 1500 ppm fluoride. Increasing the fluoride concentration by almost 3.5 times (from 1500 to 5000 ppm) only doubles the background fluoride concentrations in saliva, biofilm, and biofilms.

The work of Sh. A. Zokirkhanova presents the results of a study on the evaluation of the effectiveness of endogenous fluoride prophylaxis of caries, developed by the authors of bottled fluoride-containing water (BFW) "Aqua dental", in 3-6-year-old children attending pre-school educational institutions of the Almazar and Kibray districts of the Tashkent region. Endogenous use of BFV for caries prevention helps to improve the condition and quality of oral fluid. It has been established that endogenous fluoroprophylaxis leads to a decrease in the hygiene index from 12.30 to 17.76%, as well as a decrease in the intensity and progression of the disease from 45.2 to 56.0% [14].

In the European part of the post-Soviet space, trends in the prevalence of dental caries among children in general do not coincide with the observed fantastic decline in dental diseases in the countries of Western Europe and the USA. [39. –P. 48–54.].

Sufficient research has been conducted to prove the high efficiency of fluorides in remineralization and anti-caries action on hard dental tissues. Since water fluoridation is a popular method of preventing dental caries among the US

population, mild forms of fluorosis among 9-year-old children were detected only in 26% and 19% among 17-year-old children, while moderate and severe forms were diagnosed very rarely - in 1.1% of cases or 0.3%, respectively. Sufficient studies have been conducted proving the high efficiency of fluorides in remineralization and anti-caries action on hard dental tissues. [110. – P.10-11.]

When conducting research, knowledge of fluoride concentrations in drinking water in different regions gives us the opportunity to achieve maximum effect, since if in a certain place it is below the norm, it is possible to use fluorinated additives. But if this result is higher than the norm, that is, more than 2 ppm, it is necessary to use water from other sources, brush your teeth 2 times a day with fluoride-containing toothpaste (for children under 6 years old, the use of fluoride-containing toothpaste should not exceed 0.25 g) and do not use fluoride-containing mouthwashes. [110. – P.10-11.].

Dean found that children aged 9 years living in various counties of North Dakota with 1.7 to 2.5 parts per million F in drinking water (where enamel fluorosis was frequent but not severe) had only 2 teeth with caries, while those in counties with 0.6 to 1.5 parts per million F in water had 4.2 caries [75. –P. 43-52.].

Salt fluoridation is sometimes proposed as a solution for local residents who have low fluoride concentrations in their water and do not have the ability to implement public water fluoridation [84].

From the research data of T.N. Tereksova, it has been proven that when using fluoridated salt for prevention, it significantly improves the overall resistance of the body, as well as nonspecific resistance of the oral cavity and the level of secretory immunoglobulins. [58. –C. 38.].

Salt fluoridation is used in many countries as an alternative to fluoridated water. It is recommended that a national fluoride programme use only one of these approaches. [83. –P. 321–329.]

After an early start in 1955, the introduction and acceptance of fluorinated salt (FS) for household use in Switzerland was slow, because until about 1980 the Strategy to Support the Use of FS. Some of the dental community still supported

fluoridation of water, while others criticized the low concentration of fluoride in the salt (90 parts per million). All cantons of Switzerland have a historical monopoly on the salt trade, and by 1983 most cantonal governments had decided to allow the sale of fluoridated household salt. Several cantonal governments made fluorinated salt the only available form of "kitchen salt" in 1 kg packages. After the concentration was increased to 250 parts per million in 1983, the use of fluorinated salt gained further acceptance [106. –P. 651–655.].

Salt fluoridation is certainly the cheapest method of treating caries. prevention, and billions of people around the world use this method. [105. –P. 140-155]

Some Asian countries, including Cambodia and Laos, have recently introduced salt fluoridation. [95. –P. 5-10.] In Africa, Madagascar has also implemented salt fluoridation. [96. –P. 2-4.]

The advantages of using salt as a vehicle for delivering fluoride outweigh the disadvantages associated with this method, such as variations in food intake, difficulty maintaining ideal concentrations, and problems with hypertension [101]. Because of the risk of elevated fluoride levels, consumption of both fluoridated water and fluoridated salt is not recommended. Countries where both indicators are used have a higher prevalence of fluorosis.

One of the forms of introducing fluorine into the surface layer of enamel with the aim of further increasing its resistance is the use of fluoride-containing toothpastes for cleaning teeth. It is known that they are currently the most important source of fluoride supply for the population [33. -P. 60-63.; 59. –P.42-46.; 63. P. 53-54; 66. -P.71-73.]

The composition of children's toothpastes should always contain: lactopherins, glucose oxides, lysozyme, which strengthen immunity and increase the protective properties of saliva, but also This children's toothpaste includes various therapeutic and prophylactic additives: enzymes, xylitol, herbal extracts, calcium preparations, fluorides, which help remove teeth plaques and increased mineralization of teeth. But the most effective means are fluoride-containing pastes. [89; 110. –P. 32.; 109. P. 162-167.].

The relevance of studying the role and significance of fluoride-containing toothpastes in oral hygiene and dental caries prevention is currently beyond doubt, because Their caries-preventive effectiveness has been proven by numerous studies. It has been established that their use (for oral care), by increasing the resistance of tooth enamel, as well as decreasing its permeability and solubility, leads to a sharp decrease in the intensity of caries (from 15 to 35%) [19. - P. 18-22, ; 46. - P. 31-34.; 57. P. 21-24.].

There are many methods of dental caries prevention. In Great Britain, a study was conducted to compare the effectiveness of different methods of dental caries prevention among children. Two comparative groups were taken, for each hygienic and fluoride-containing toothpastes were selected, correct tooth brushing was shown and children regularly brushed their teeth under adult supervision. In the comparison group, brushing teeth with hygienic toothpaste was not controlled; in both groups, among children using fluoridated toothpaste, a significant improvement in the condition of the teeth and a decrease in the incidence of caries was recorded. We know that when brushing your teeth, the brush reaches the pits, fissures and proximal surfaces of the teeth, thereby not completely removing dental deposits and food debris, this This fact casts doubt on the theory of reducing dental caries with mechanical removal of dental calculus [63. P. 53-54.].. Thus, the most effective way to reduce the growth and development of caries today is the use of fluoride-containing toothpastes. According to the research results. The use of fluoride toothpaste at home helps to reduce caries reduction by 24%. [63. P. 53-54; 73. -P.231-235.; 86. -P.33-38.]

In GePMAny, a study was conducted among 2-4-year-old children on the use of fluoridated toothpaste with a fluoride concentration of 500 ppm, and according to their results, within three years, it was also said that a 24% reduction in caries of temporary teeth was achieved. [98. -P.41.]. Thus, it can be said that fluoride-containing toothpastes promote strengthening and mineralization of dental tissues and prevent the formation of hard dental deposits [1. -P.328-330.; 2. –P. 43.; 63. P. 53-54]

The most active anti-caries effect of fluoride and pastes containing it occurs during the period of enamel formation, that is, in childhood. Later, the anti-caries effectiveness of fluoride-containing pastes is significantly reduced. Therefore, it is advisable to use fluoride-containing pastes to prevent dental caries, mainly in childhood.

Today, in order to prevent caries of hard dental tissues, in addition to the internal introduction of fluoride, local fluoride-containing applications of 1-2 sodium fluoride and tin fluoride and the use of fluoride-containing varnishes and gels are used. [2. -43c.; 78. - P.683-689.; 79. -P. 19-24.].

Fluoride-containing varnishes are a composition of natural resins, containing about 3-5% fluorine. Its composition includes: fir balsam, sodium fluoride, shellac, chloroform, ethyl alcohol. During the drying process, the varnish forms a strong film that remains on the teeth for several hours; on fissures, it can retain its effectiveness for several days, even weeks. [36. -541 p.]. It turned out that the drugs to a greater extent prevented the appearance of new defects on the chewing surfaces (33.3%), and with the duration of use had an effect on the smooth sides of the tooth.

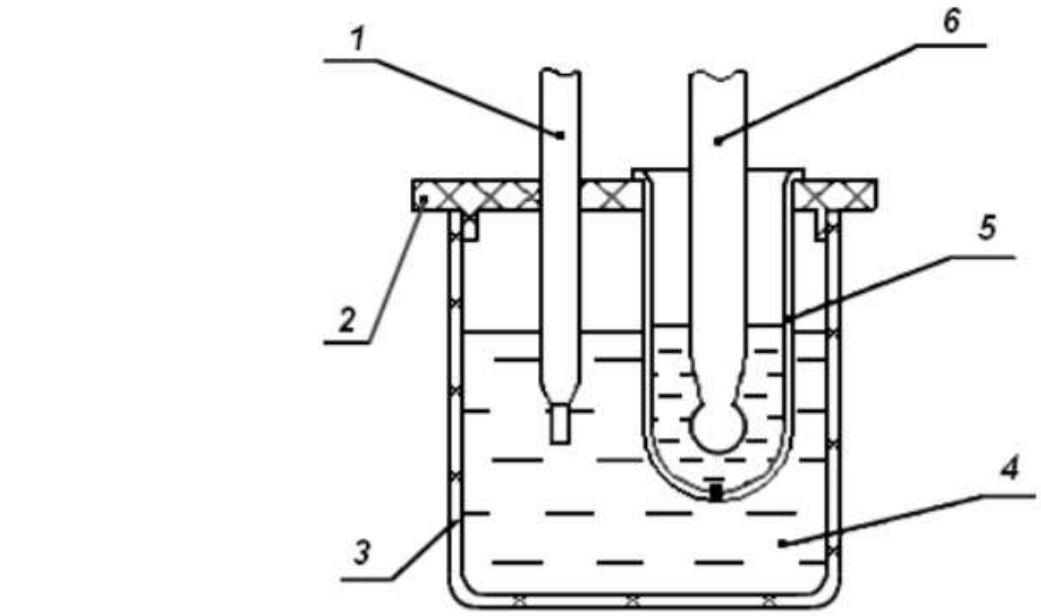
In recent years, a new, modern and affordable method of “deep fluoridation” using enamel-sealing and dentin-sealing liquid has been described in the literature for the fluoridation prevention of dental caries [6. - 304 p.; 8. -P. 26-28.; 10. –P. 17.; 20. - P. 62-64.; 21. - P. 39-42.]. "Enamel - sealing liquid" is used for prevention of carious processes, tooth surface. "Dentin - sealing liquid" is intended to combat demineralization of tooth tissue under a filling or under fixed orthopedic structures. This method is used for prevention of primary and secondary caries. Another important principle of the mechanisms of caries-preventive action of these preparations is also the destruction by copper ions of microbes that have penetrated into the deeper layers of enamel and dentin as a result of enamel demineralization [10. - 17 p.; 20. - P.62-64.]. According to the authors , deep fluoridation is an effective method of prevention, especially with secondary caries under a filling, artificial crown, bridge with a prosthesis.

Numerous studies have been conducted around the world to study the etiology and pathogenesis of dental caries among children, but to this day the most pressing issue is dental prevention, since the rapid rate of development of caries intensity is a real threat to the health of the younger generation. But solving this problem is impossible without creating and implementing preventive programs that allow you to cope with diseases of children in preschool age. [31. –C. 231.; 5. -22 c.; 100. - P. 155.].

Thus, the current level of knowledge supports the view that the use of fluoride supplements with table salt may help maintain clinical stability of enamel of both developing and mature teeth through systemic effects and, accordingly, benefit teeth throughout their life.

Method for determination of fluoride concentration in oral fluid

Fluoride ion concentration in saliva was estimated using a combination of specific fluoride ion electrode (ELIS 131 F) coupled with an ion meter and I160 MI (GOST 22261-94). Stored saliva samples were analyzed within a week after collection. They were brought to room temperature (room temperature was maintained at 25ºC) and treated with a buffer solution BROIS (Buffer solution with high ionic strength, added to the analyzed and control solutions for leveling their ionic strength). One milliliter of saliva was transferred with a pipette into another plastic bottle and the buffer solution was collected in accordance with the manufacturer's instructions. When measuring small-volume samples (micro measurements), a glass with a lid is used, in which there are openings for installing a reference electrode, a temperature sensor (thermometer) and an electrolytic key (Figure 1). The sample is placed in the hollow part of the key, and the working part of the measuring electrode is lowered into it. The reference electrode is immersed in a glass filled with a saturated KCl solution. The KCl solution level should be such as to ensure reliable contact with the porous membrane of the key. When using an ion meter as a measuring device, there is no need to plot a calibration graph. In this case, calibration is usually carried out with two more solutions, according to the ion meter operating instructions. The device stores the calibration results in its memory, and during subsequent measurements it makes the necessary calculations and displays the results on the display.



1 Электрод сравнения
2 Крышка
3 Стакан
4 Раствор KCl
5 Ключ электролитический
6 Измерительный электрод

Fig. 1. Measurements of micro-volume samples using the I160 MI ion meter

The sample is placed in the hollow part of the key, and the working part of the measuring electrode is lowered into it. The reference electrode is immersed in a glass filled with a saturated KCl solution. The level of the KCl solution should be such as to ensure reliable contact with the porous membrane of the key. When using an ion meter as a measuring device, there is no need to construct a grading graph. In this case, the calibration is usually carried out using two or more solutions, in accordance with the ion meter operating instructions. The device stores the results of calibration in its memory, and in further measurements it makes the necessary calculations and displays the results on the display.

Method for determining the pH of oral fluid the pH measurement was carried out at a saliva temperature of 25°C with the same ionomer and I160 MI (GOST 22261-94) using an electrode for determining pH. When calibrating the device, standard buffer solutions prepared from standard titers were used as a control.

Direct potentiometric method for measuring fluoride concentration in drinking water

One of the most significant achievements in the analytical chemistry of fluorides was the invention of the fluorine-selective electrode by Frant and Ross in 1966 [916]. The fluorine-selective electrode (F-electrode) responds to the activity of free fluoride ions only. The F-electrode is tolerant to sulfate, phosphate and organic compounds that cause serious interference in spectrometry and fluorometry, as well as to non-ionic fluorides.

At pH ≥5, fluoride is almost completely ionized, whereas in an acidic medium it exists mainly in a non-ionized form (as HF) and is therefore not recognized by the F-electrode. Hydroxyl ions can also interfere with the measurement if (in an alkaline medium) their concentration is an order of magnitude higher than the concentration of fluorides. Therefore, to work with the F-electrode, an environment with a pH of =5...6 must be created.

The electrode reacts to changes in the activity of ions in the solution, the ionic function depends on the ionic strength of the solution, therefore the ionic strengths of the analyzed and standard solutions are necessary maintain at the same level. This and the above conditions are met by adding buffers (citrate-ethanol, etc. or TISAB, which also contains reagents for releasing fluoride from complexes with metal ions) to the sample and standard.

The measurement of very low fluoride concentrations (approximately 1 μl/l) requires absolutely strict adherence to all the rules for working with the F-electrode, a long wait to achieve equilibrium and the use of a large number of standards. These problems can be solved by using one or another method of concentrating fluorides described above.

When studying samples with a very high concentration of fluorides, another problem arises: the reference electrode, filled with gel and having pores, can capture a significant amount of fluoride from the sample and contaminate the next sample with it, which is especially important if the latter has a small amount of fluoride. To avoid distortions of this kind, it is necessary, firstly, to be strict in the choice of the reference electrode and, secondly, to plan the analysis of standards

and the final analysis of samples in the order of increasing fluoride concentration in them.

For measuring fluoride in small volumes (for example, in blood serum, urine, milk, saliva samples, in all cases after back extraction of fluoride), a “drop” electrode and some other modifications of selective electrodes have been developed. Further improvements are being made in the direction of eliminating cross-contamination of samples (replacing fluorine-sensitive membranes, creating agar bridges between samples, placing the sample in a sandwich between the fluorine-selective and reference electrodes, etc.) and reducing the time required to study a series of samples (developing adapters for simultaneous measurement of several samples with one electrode).

For electrochemical measurement of fluoride concentration in sub-microliter and nanoliter volumes (such as, for example, the volume of a dental plaque liquid sample), the Vogel micro-method is used, a micro-drop of the sample is placed on an inverted fluoride-selective electrode under a layer of oil and a capillary reference micro-electrode is brought to the sample.

For the study, we chose the Tashkent region. In order to determine the concentration of fluoride in drinking water of the Tashkent region, samples of drinking water were collected from 20 preschool institutions located in 5 cities and 9 districts of the region. Water samples were collected in accordance with the requirements of the interstate standard (GOST 31861-2012).

Fluorine concentration in the collected samples was determined by the potentiometric method. For this purpose, a laboratory ion meter Ionomer I 160 MI was used. Each sample was tested 8 times and the arithmetic mean was calculated. The collected waters were collected in a polyethylene container. If it was impossible to determine the fluorine concentration on the day of collection, the samples were stored in a refrigerator at $t = 6\ ^0C$ for no more than 2 days. The content of fluorine (fluorine ion) in the samples was determined by a fluoride-selective solid-contact electrode ELIS 131 F, designed for potential measurement of the concentration of fluorine ions in liquid in a complex with an ion meter of the laboratory automated type ION METER LABORATORY I-160MI. An equal

amount of BROIS buffer solution was added to 10 ml of the prepared samples, then they were placed on a magnetic stirrer, the electrodes were immersed in the solution and they waited for the equilibrium value of the potential to be established. Each sample was analyzed three times and the concentration of fluoride ions was found from the value of the electrode potential from the calibration dependence.

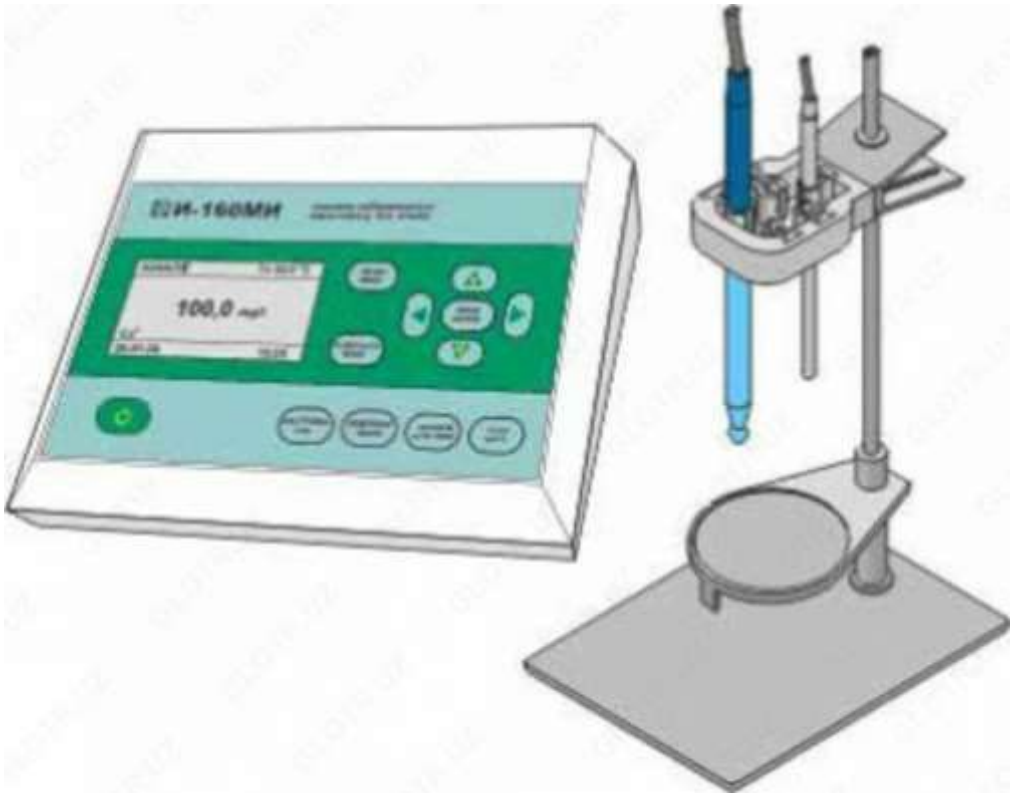


Fig. 2. Ion meter I160 MI

Methods of adding fluorides to food salt

Addition of fluorides to salt is carried out by a wet or dry method. The fluorinated salt obtained by both of these methods is identical. Usually, the salt is subjected to multiple enrichment. Simultaneously with fluoridation, the salt is iodized with either iodides or iodates. Below we describe both of these methods.

Chemical compounds for fluoridation An important criterion for choosing a fluoridation process is solubility in water. While potassium fluoride dissolves well in water, sodium fluoride dissolves much worse. Potassium fluoride is noticeably hygroscopic, while sodium fluoride is not. The difference in price between the two fluorides means that when adding 250 mg/kg of salt, the cost of the compound, which is a small part of the total cost of adding fluoride to salt, is about three times higher than when adding fluoride to salt. using potassium fluoride instead of sodium fluoride

Process chain. A typical procedure for fluorinated salt production starts with crystallization of the salt (evaporated salt, sea salt), then washing the salt crystals either before or during separation of the salt crystals from the saturated brine by centrifugation in pusher or mesh centrifuges and drying the salt with hot air in fluidized bed dryers or rotating drum dryers. The fine and coarse particles formed during crystallization are separated by sieves or air separators and used for special purposes. Additives can be added either before the drying process or after grain size classification. Since salt producers usually also produce fluoride-free edible salt, the additive is usually added after the fluidized bed dryer and sieving. The actual point of adding fluoride also depends on whether a wet or dry method is used. Dry fluoridation of salt is only possible if fluoride is not added until the drying and sieving stages are completed. Otherwise, due to the small grain size, fluoride will be removed from the salt again at the outlet of the dryer or during sieving. When fluorine is added before the drying agent, the fluidized bed mixes the fluoride with the salt. When fluorine is added after sieving, a stirrer must be used to achieve a homogeneous mixture. It is recommended to add fluorine only after the drying and sieving stages, since the fluorine content in

different-sized grains is different, and it is difficult to maintain the required level due to the separation of small and large particles. fluoride content.

Wet method. In the wet method, an aqueous solution of potassium fluoride is continuously sprayed in a certain ratio onto the salt passing by on a conveyor belt. The concentration of the solution can vary, but it should be as high as possible so that the carryover of water into the dried salt remains low. To achieve the required homogeneity, the salt then undergoes a mixing stage. The mixers are either fluidized bed dryers or continuous mixers. In batch processing, the potassium fluoride solution is sprayed directly into the batch mixer.

Dry method. Only sodium fluoride is suitable for this method, since the dosage of potassium fluoride cannot be reliably controlled due to its extreme hygroscopicity. Powdered sodium fluoride is continuously fed by a solids dispenser into a continuous mixer or mixed in portions with salt in a batch mixer. Sodium fluoride with a grain size from 10 to 20 microns is used to obtain a homogeneous product without tendency

Together with the local producer of edible salt, the company “Light snacks”, we developed technological instructions for the production of C According to GOST 138830-97, when producing salt, we adhered to the iodinated-fluorinated edible salt Royal “Fluor +” (Fig. 3). wet method

Fig . 3. Form of release of iodinated-fluorinated salt "ROYAL FTOR PLYUS"

ООО «LGHT SNACKS»

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«14» 12 2020 г.

ТЕХНОЛОГИЧЕСКАЯ ИНСТРУКЦИЯ

ПО ПРОИЗВОДСТВУ ЙОДИРОВАННО - ФТОРИРОВАННОЙ ПИЩЕВОЙ СОЛИ «ФТОР +»

ТИ 302285134-02:2020

Дата введения с «17» 12 2020 г.

РАЗРАБОТАНО
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«___» _____ 2020 г.

Fig. 2.4 Technical instructions for the production of iodized-fluorinated food salt "ROYAL FTOR+"

Dental status of preschool children living in Tashkent region

To solve the problem set before us to study the dental status of preschool children living in the Tashkent region, we examined 118 pupils aged 4-6 years, whose average age was 5.32±0.06. Among those surveyed, there were 63 boys (53.4%), and 55 girls (46.6%) - pupils of the Tashkent, Chinaz, Akkurgan and Yangiyul districts of the Tashkent region.

Table 1

Distribution of all surveyed preschool-age children by regions of the Republic

Gender/area	Tashkent n- 21		Akkurgansky n- 37		Chinese n- 45		Yangiyulsky n- 15		In total n- 118	
	Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%
boys	12	57.14	21	56.76	21	46.67	9	60	63	53.38
girls	9	42.86	16	43.24	24	53.33	6	40	55	46.62
in total	21	17.79	37	31,36	45	38.14	15	12.71	118	100

Fig. 5 Distribution of all surveyed children by gender

A comparative analysis of the obtained results showed that the distribution by gender of all children both in the general group and in the districts of the region was practically the same.

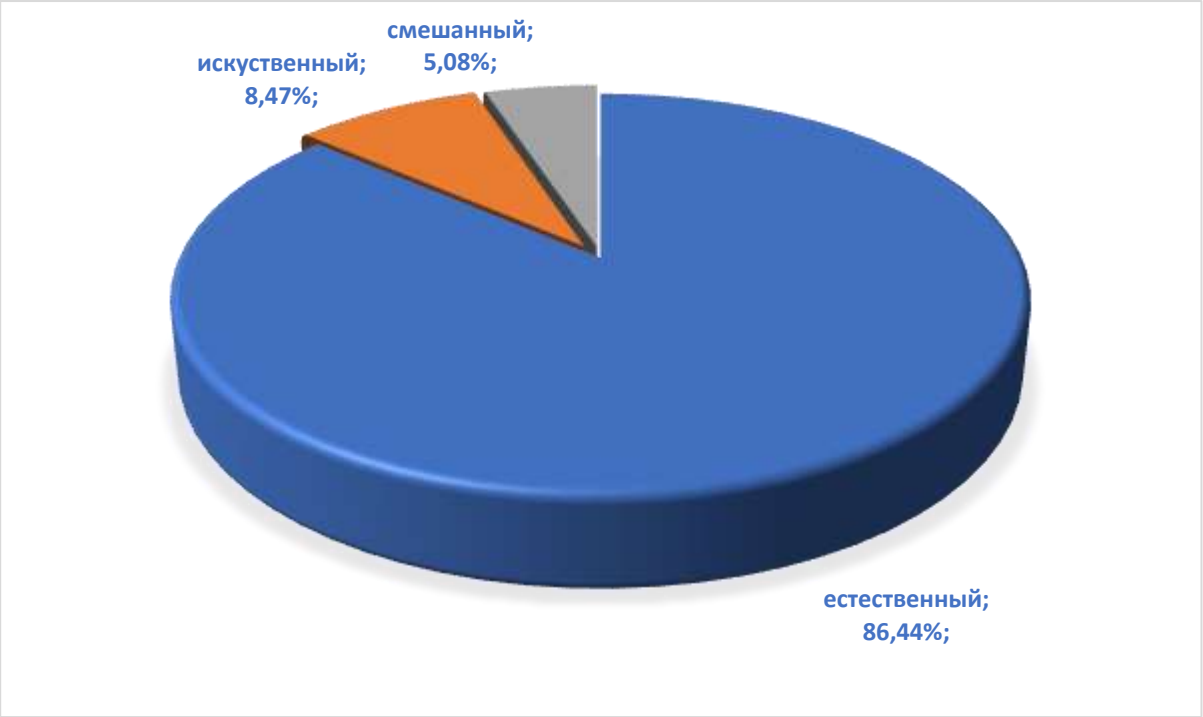


Fig. 6. Distribution of children by type of feeding

As is known, breastfeeding protects the child's body from many infections, including dental ones. All organs and systems (digestive, circulatory , endocrine, nervous and immune) are formed and function properly in a child who is breastfed. As a result, the child will be resistant to various diseases in the future, including caries and its complications. Considering the importance of mother's milk for the child's body, we analyzed and found that most of our children were breastfed (86.44%), mixed fed - 5.08% and artificially fed - 8.47%.

Women with somatic pathology have a high risk of non-physiological pregnancy. Toxicosis in the first half of pregnancy (6-7 weeks) negatively affects the growth and formation of the rudiments of milk teeth. The study of dental caries has shown that in the pathological period of pregnancy, the process of mineralization of tooth enamel in the fetus slows down and often stops at the initial stage of mineralization. We also took into account in our research the indicator of how the mother's body tolerates pregnancy, that is, how many children are born from the number of pregnancies. Scientists have proven that the number of pregnancies is proportional to the number of children in the family and

affects oral health. As a result of our research it is evident that more than 94% of children in the family are born in accordance with pregnancy, and mismatch was observed in 6% of cases. As can be seen from the results, mothers in most cases were healthy and premorbid background cannot be the leading cause of caries in children.

The results of the anamnestic data also showed that 44.07% of the children we examined were the second child of the second pregnancy, 33.9% were the first, 20.34% were the third child, and only 1.7% had four children in the family.

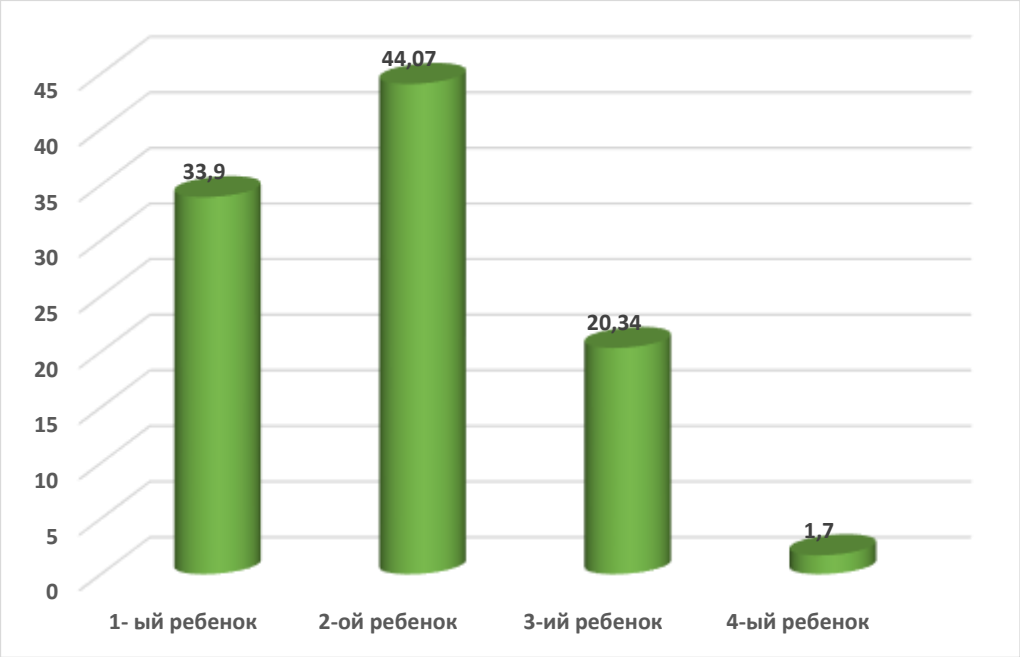


Fig. 7. Number of children in the family

We conducted a survey of parents and found that 45% of children brush their teeth once a day and 35% of children brush their teeth twice a day, while 10% of children brush their teeth 2-3 times a week.

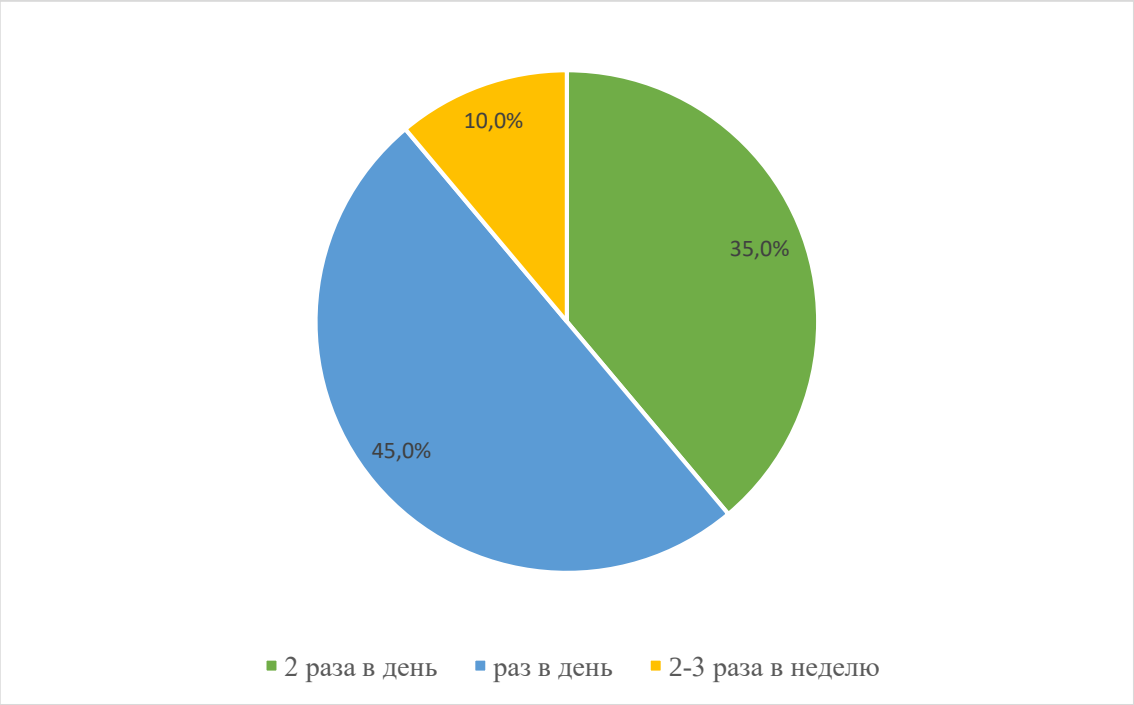


Fig. 8 Frequency of tooth brushing in preschool-aged children living in Tashkent region (n=118)

Personal oral hygiene rules include the correct use of personal hygiene products. To do this, it is necessary, as recommended by the dentist, to choose the right toothpaste and brush, as well as to ensure constant parental supervision of correct and timely brushing of teeth and replacement of the toothbrush within 3 months. Since long-term use of a toothbrush can lead to an increase in cariogenic bacteria in the toothbrush, as a result, the oral cavity can become infected with pathogenic bacteria every time you brush your teeth. Therefore, the International Dental Association recommends changing your toothbrush every 3 months. A study of the frequency of changing toothbrushes revealed the following results: 75% of children change their toothbrushes every 3 months, 11% every 4 months and 12% every 6 months.

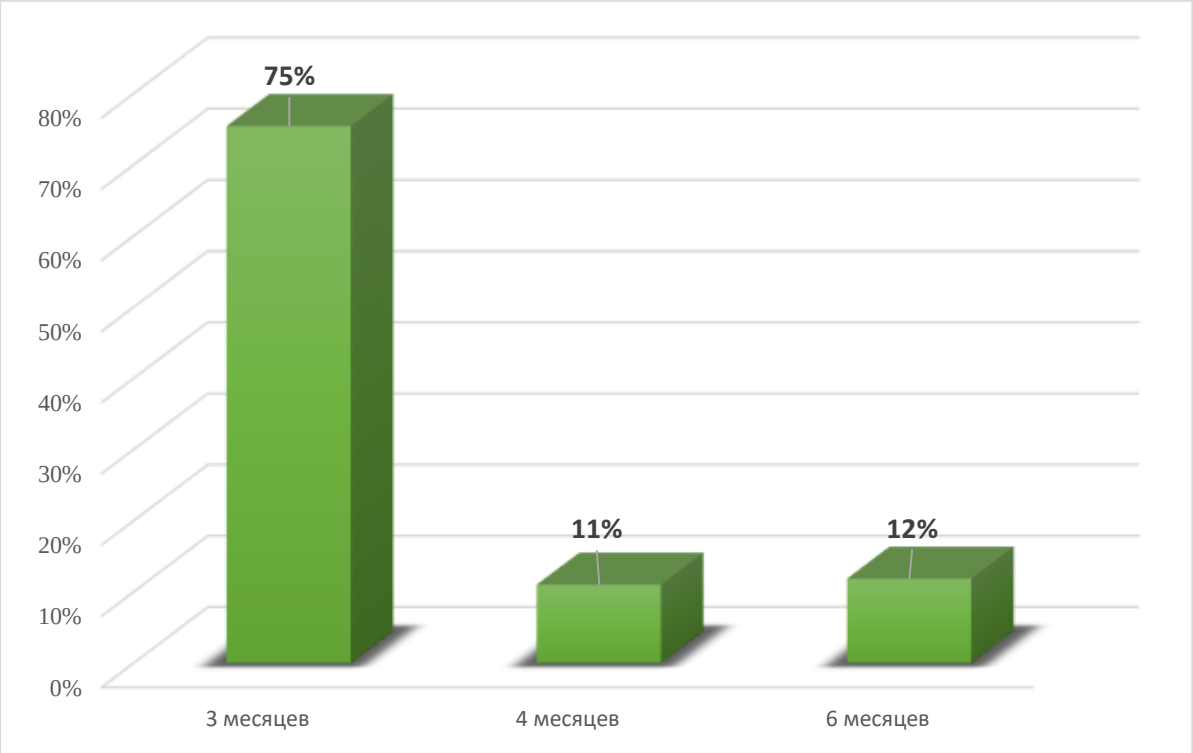


Fig. 9 Frequency of changing toothbrushes in the studied children

The prevalence of dental caries is determined by the number of people (in percent) with dental caries. The intensity of caries is determined by the number of teeth affected by caries: treated, untreated and extracted, by the KPU index (K - carious tooth, P - filled, U - extracted), for children with primary dentition kp (k - carious primary, p - filled primary u - extracted), for children with mixed dentition - KPU + kp.

Of the total number of 118 children aged 4-6 years examined, 104 children had teeth affected by caries, indicating a high prevalence of 88.13%. 75.20% of the children had decayed teeth that had not been treated previously. Among the three age groups, 4-year-olds had the lowest prevalence of 61.54% and 2.62 DCI (dental caries intensity index), 5-year-olds had 85.71% and DCI was 5.55, while 6-year-olds had the highest prevalence of 97.87% and DCI was 6.62.

Table 2.Intensity of dental caries in preschool children (n-118)

Age groups	n		kp, kpu+kp	Degree of intensity
	Abs.	%		
4 year old children	13	11 , 02	2.62±0.7	Average degree (2.7-4.4)
5 year old children	56	47,46	5 , 55 ±0.6*	high (6.6 <)
6 year old children	4 9	41.5	6.62±0.6*	Very high (6.6 <)

Note : * - P <0.05 significance relative to 4-year-old children

A significant relationship was found between age and the prevalence of dental caries in children (Table 3). With increasing age, a tendency toward an increase in the dental caries intensity index was noted.

For a detailed study of the structure of dental caries in preschool children in the Tashkent region, we conducted studies of the intensity of caries according to the index kpup, kpup+kpp, in order to determine how many surfaces are involved in the carious process.

We have established that in many teeth of the examined children, caries was observed most of all in the proximal surfaces of the primary molars and usually proceeded both in the first class according to Black and in the second. From Table 3 it is evident that the values of KPP are greater than the values of KPU + KP and this is explained by the fact that in most cases more than one surface of the tooth is damaged by caries.

Table 3

Intensity of dental caries in preschool children according to indices dmfc, DMFc+dcf (n-118)

Age groups	n		DMF+dcf ,dc	**DMFc** +dcf, dcf	Degree of intensity
	Abs.	%			
4 year old children	13	11 , 02	2.62±0.7	4.0±1.13	Average degree (2.7-4.4)
5 year old children	56	47,46	5 , 55 ±0.6*	7.34±0.79	high (6.6 <)
6 year old children	49	41.5	6.62±0.6*	8.28±0.79	Very high (6.6 <)

The level of hygiene knowledge of all surveyed children was studied in a preschool educational institution. The study revealed that the level of children's basic knowledge of personal oral hygiene was limited to knowledge of the need to brush their teeth and use a toothbrush with toothpaste applied to it for this purpose. Most children had no idea about the duration of the hygiene procedure, methods of brushing teeth, or brushing time.

When studying the state of oral hygiene, the Fedorov-Volodkina method (hygiene index) was used. When determining this index, it is necessary to stain six frontal teeth of the lower jaw with Schiller-Pisarev solution, and a quantitative assessment is made from 1 to 5 points.

When studying the hygienic state of the oral cavity in the children we examined, it was revealed that the GI on average was equal to 2.04±0.05 points, which corresponded to a satisfactory level of oral hygiene.

The intensity of dental caries depends on the hygienic condition of the oral cavity. The average values of the oral hygiene index are presented in Table 3.4. Analysis of the oral hygiene index in children shows that 17 (14.41±0.34) children had a good level of IG, 16 (13.56±0.34) children had a poor level, and 85 (72.03±0.78) children had a satisfactory level of IG.

Table 4.

Level of oral hygiene in preschool children (n=118)

Level of oral hygiene	Hygiene Index	
	abs	%
Good (1.1-1.5)	17	14.41 ±0.34
Satisfactory (1.6-2)	85	7 2.03± 0.7 8 *
Unsatisfactory (2.1-2.5)	0	0
Bad (2.6-3.4)	16	13.56 ± 0.34
very bad (3.5 -5)	0	0

Note: * - P <0.05 significant relative to the “poor level” criterion

Table 5 .

Relationship between hygiene index and intensity of dental caries in children depending on age

Age groups	DMF± df	Hygiene index
4 year olds children (n-13)	2.62±0.68	2.23±0.28
5 year olds children (n-56)	5.55±0.60*	2.02±0.06
6 year olds children (n- 49)	6.62±0.62*	2.00±0.07

Note: * - P <0.05 significance relative to 4-year-old children

The obtained results of the comparative analysis of the criterion of dental caries intensity and oral hygiene depending on age showed that with the age of 5-6 years old children a high degree of caries intensity is observed, despite the fact that in the children we examined (on average, 85 (72.03±0.78%) a satisfactory level of IG (1.6-2) was detected.

We have studied the level of caries intensity using the method proposed by Leus P.A. [8]. The essence of the UIC method is that the digital value of the individual's KPU index should be divided by his age (in years). The result is an average indicator of the intensity of dental caries at the time of the patient's examination. Taking into account age characteristics (children and adults) and world experience in epidemiological writing when studying the intensity of dental caries, the following formula was proposed for children under 8 years of age:

To identify the UIC of temporary teeth in children under 8 years of age:

UIC = kpya years,

where kp - caries, filling of temporary teeth;

years - age of the person being examined in years.

Having analyzed the level of dental caries intensity (LIC) in the general group of examined children, we found that 42.31% of children generally had a very high level of dental caries intensity, high – in 15.38% of children with caries, in 27.88% a medium level of dental caries intensity was detected, and low level of dental caries intensity was registered in 14.42% of those examined (Table 6).

Table 6

Level of caries intensity in the examined children with caries in Tashkent region (n=104)

Evaluation criteria for the PEC		UIC (M ± m%)	
		Abs.	%
≤0.4	Short	15	14.42±0.37
0.5–0.8	Average	29	27.88±0.52*
0.9–1.2	Tall	16	15.38±0.38
≥1.3	Very tall	44	42.31±0.64•

Note : *- P < 0.05 significance relative to the low level, • - P < 0.05 significance relative to the average level indicators

Table 7

The relationship between the dental caries intensity index and the level of caries intensity in children depending on the age of residents in the Tashkent region (n = 118)

Age groups	kpu, kpu+kp	PEC
4-year-old child (n-13)	2.62±0.68	0.65±0.17
5-year-old child (n-56)	5.55±0.60*	1.11±0.12*
6-year-old child (n- 49)	6.62±0.62*	1.10±0.10*

Note: * - P <0.05 significance relative to 4-year-old children

Table 8

Level of intensity of dental caries in children depending on the age of the children

Polling station criteria	4 years olds (13)		5 years old (56)		6 years old (49)	
	abs.	%	abs.	%	abs.	%
Low (≤0.4)	5	38.46±1.72	19	33.93±0.78*	5	10.20±0.46*•
Average (0.5–0.8)	3	23.08±1.33	8	14.29±0.50*	17	34.69±0.84*•
High (0.9–1.2)	2	15.38±1.09	6	10.71±0.44*	9	18.37±0.61*•
Very high (≥1.3)	3	23.08±1.33	23	41.07±0.85*	18	36.73±0.86*•

Note: * - P <0.05 significance relative to indicators of 4-year-old children; • - P <0.05 significance relative to the indicators of 5-year-old children

We conducted a study of the health of the gums of the examined children using the PMA index, which shows the intensity of inflammatory processes in the gum tissue.

The analysis of the PMA index of children living in the Tashkent region showed that the study of the level of gum health according to the PMA index shows the presence of an average degree (55.53±1.6) of severity of inflammatory processes, on average, which corresponds to the pronounced prevalence and intensity of the pathological process in the tissues of the marginal periodontium.

Table 9

PMA inflammation index in a group of preschool children examined

PMA index criteria	PMA indicator	
	Abs.	%
Light degree ≤ 30%	5	4.24±0.19
Average degree of gingivitis 31-60%	65	55.08±0.68*
Severe gingivitis 61% and above	48	40.68±0.59

Note : P <0.05 significance for severe severity rates

In particular, in 5 (4.24±0.19 %) examined children the clinical index PMA showed a mild degree of inflammation, in 65 (55.08±0.68 %) and 48 (40.68±0.59 %) children these indicators reflected a moderate degree of gingivitis.

A comparative analysis of the severity of the inflammatory process in the gums of the examined children with caries depending on age showed that, regardless of the age of the examined, almost all of them had an inflammatory process in the gingival tissue, the average severity was observed mainly in 4-year-old (76.92±2.42) and 5-year-old (57.14±1.01) children, while 6-year-old children had severe degree of gingivitis (51.06 ±1.04).

Table 10

Inflammation index in the group of examined children depending on age

PMA index criteria	PMA indicator					
	4year olds		5 year olds		6 year olds	
	Abs.	%	Abs.	%	Abs.	%
Light degree ≤ 30%	-	-	3	5.36±0.31	2	4.26±0.30
Average degree of gingivitis 31-60%	10	76.92±2.42	32	57.14±1.01*	21	44.68±0.97*•
Severe gingivitis 61% and above	3	23.08±1.33	21	37.50±0.82*	24	51.06±1.04*•

Note : * - P <0.05 significance relative to indicators of 4-year-old children; • - P <0.05 significance relative to the indicators of 5-year-old children

Thus, despite the significant prevalence of natural feeding over artificial feeding and the presence of satisfactory oral hygiene in preschool children living in the Tashkent region, there is a prevalence of high and very high levels of caries

intensity. Which, in our opinion, is associated with changes in the physicochemical properties of oral fluid.

Physicochemical properties of oral fluid of preschool children in Tashkent region

Knowledge of the composition of saliva is important for the functioning of its individual components, as well as for the growing interest in salivary-based diagnostics. Numerous studies aimed at studying the state of the oral cavity prove that the condition of the tissues and organs of the oral cavity largely depends on the properties and condition of the oral fluid. Reflection of the body's state in saliva can potentially be used to monitor the general state of health, the onset and progression of disease. Protein biomarkers in biological fluids, in particular those that can be measured accurately and reproducibly, can provide valuable information on the body's response to treatment of a disease or condition, including long-term monitoring of oral diseases. Biomarkers may also serve as an early indicator of disease, which is a promising alternative to conventional oral diagnostic approaches.

The hydrogen index provides extensive information, since under the influence of physiological and pathological processes, its value changes, and the acid-base balance in the oral cavity is disrupted. Changes in the pH value of oral fluid can occur due to the influence of many endogenous and exogenous factors: professional and environmental hazards, taking medications, using hygiene products, dentures, filled teeth, general condition of the body, etc. Today, it is important to study the regulation of acid-base balance in the oral cavity for early diagnosis and prediction of the occurrence of dental caries and inflammatory periodontal diseases [3].

The rate of salivation significantly affects the acidity of saliva; noPMAlly, the pH of mixed saliva is 6.8-7.4, and with an increase in the rate of salivation, the pH value reaches 7.8. On average, in children, the acidity of mixed saliva is 7.32 pH.

As a result of the conducted research among preschool children, we found that the prevalence and intensity of dental caries is high, as a result of which such parameters of saliva as the amount of fluoride content in saliva and the hydrogen index were studied.

The hydrogen index is the main natural regulator of homeostasis of the mineral components of enamel: the lower it is, the faster the demineralization process.

A comparative analysis of the acidity of mixed saliva in preschool-aged children by region of the Tashkent region showed that the fluctuations in average values ranged from 6.45 to 6.98. (Table 11).

The obtained results show that the pH of saliva in children of the Akkurgan (6.64±0.06) and Yangiyul (6.45±0.09) districts is significantly lower than the pH of saliva in the Tashkent district (6.98±0.08) (P>0.05) (Table 11).

Table 11

Physico-chemical properties of mixed saliva of children of the Tashkent region of preschool age, depending on the region

Indicator	control	Tashkent (21)	Akkurgans-kiy (37)	Chinese (45)	Yangiyul-kiy (15)
Fluorine (F)mmol/l		0.02±0.002	0.02±0.001	0.02±0.001	0.02±0.001
pH	6.8-7.4	6.98±0.08	6.64±0.06*	6.80±0.03•	6.45±0.09* -

Note : * - P <0.05 significance relative to the indicators of children in the Tashkent district; • - P <0.05 significance relative to the indicators of children in the Akkurgan district; - P <0.05 significance relative to the indicators of children in the Far East of China district

Thus, the studies show that the level of hydrogen index is somewhat lower than generally accepted norms, which may have a certain significance in demineralization and development of caries in children in the surveyed area.

A comparative analysis of the pH of the saliva of the examined girls and boys was also conducted. We did not find any differences in the concentration of hydrogen ions in the oral fluid between boys and girls of the Far East of the Tashkent region (P> 0.05) (Table 12).

The mineralizing capacity of saliva depends to a large extent on the content of fluoride ions in it. In the present study, the concentration of fluoride in saliva was found to be within the range of 0.0013 to 0.022 mg/l for 118 children who did not consume fluoride and lived in the Tashkent region with a fluoride content in drinking water (0.21±0.09). The fluoride ion level in the oral fluid of children from the Far East, depending on the regions of the Tashkent region, did not reveal reliable differences, averaging 0.02±0.001 mg/l. Analysis of the fluoride content depending on gender revealed - in boys 0.02 ± 0.001 mg/l, in girls this indicator had the same values 0.02±0.001 mg/l (Table 13).

Table 13

Physico-chemical properties of mixed saliva of preschool children in the Tashkent region depending on gender

Tashkent region (n=118)	Saliva indicators	
	pH	F (mg/l)
Boys (n= 63)	6 ,65 ±0,0 4	0.02 ± 0.001
Girls (n= 55)	6.74 ± 0.04	0.02 ± 0.001
Total (n=118)	6.64± 0.04	0.02 ± 0.001

Note: * - differences relative to the data for the boys group are insignificant (P >0.05)

We did not find any differences in the concentration of hydrogen ions in the oral fluid between boys and girls in the main and control groups (P>0.05). We do not consider it appropriate to further analyze this indicator by gender and consider it appropriate to use the average values for children of both sexes in each group.

Thus, based on the above, a cause-and-effect relationship is observed between the high level of dental caries intensity associated with a shift in the pH index to acidic in mixed saliva and insufficient fluoride content in the mixed saliva of preschool-aged children living in the Tashkent region.

Characteristics of dental indicators of the state of organs and tissues of the oral cavity in preschool children of Tashkent, Akkurgan, Chinaz and Yangiyul districts of Tashkent region.

When studying the dental status, we analyzed the prevalence of dental caries in children of the Far East of Tashkent (n=21), Akkurgan (n=37), Yangiyul (n=15) and Chinaz (n=45) districts of Tashkent region. The obtained data indicate a high level of prevalence of caries of temporary teeth in all study groups. In Tashkent district, all (100%) examined children were found to have dental caries, the level of which was 27.03% higher than the prevalence rate of dental caries in children of the far east of Akkurgan district (72.97%), 4.44% higher than in Chinaz district (95.56%) and 6.67% higher than in children of the far east of Yangiyul district (Table 3.14). The intensity index was the highest in children of the Tashkent district (6.62±1.57), 1.05 times higher than in Chinaz (6.29±0.61), 1.24 (5.33±0.90) times higher than in Yangiyul district and 1.47 times (4.51±0.76) higher than the KPU+kp of children of Akkurgan district.

Table 14

Dental status of preschool children depending on the districts of Tashkent region

Indicator	Tashkent (21)	Akkurgansky (37)	Chinese (45)	Yangiyulsky (15)
CPU + cp, cpu	6.62±1.57	4.51 ± 0.76	6.29±0.61	5.33±0.90
PMA (%)	61.09±3.33	62.77±2.60	53.73±2.87	74.22±3.79*
GI	2, 29 ± 0.16	1.97 ± 0.10	2.04 ± 0.07	1.87 ± 0.13
PEC	1.27 ± 0.16	0.83 ± 0.14 *	1.09 ± 0.13	0.95 ± 0.16
Prevalence of dental caries (%)	100	72.97	95.56	93.33
USP	27.01±4.15	48.60±6.21*	34.75±4.84	33.63±7.14

Note : * - P <0.05 significance relative to the indicators of children in the Tashkent district; • - P <0.05 significance relative to the indicators of children in the Akkurgan district; - P <0.05 significance relative to the indicators of children in the Far East of China district

When studying the hygienic condition of the oral cavity in the children we examined, it was revealed that the GI on average was equal to 2.29±0.16 points,

but, at the same time, in children of the Tashkent region, the average GI index was slightly higher . but did not differ significantly from the average level of the indicator for the region, indicating a satisfactory level of children's dental and oral hygiene skills. The average oral hygiene index of the examined children from Chinaz (2.04±0.07), (2.29±0.16), Akkurgan (1.97±0.10), Yangiyul (1.87±0.13) districts met the criterion of satisfactory oral hygiene according to Fedorova-Volodkina.

The increase in the intensity of dental caries depends on many indicators, especially on the hygienic condition of the oral cavity. The average value of the intensity level of dental caries separately by region of the Tashkent region is presented in table. 14.

Comparative analysis of the level of intensity of dental caries (LIC) of the examined children in the Tashkent district of the Tashkent region revealed that 47.62 ± 1.50 % of children mainly had a very high level of intensity of dental caries, 14.29 ± 0.82 % had a high level and an average level of intensity of dental caries was registered in 33.3 ± 1.26 % of the examined children.

In the Akkurgan district of the Tashkent region, during the examination of children, it was established that the majority had a low level of caries intensity (48.65 ± 1.14 %), medium in 10.81 ± 0.54 %, high in 10.81 ± 0.54 % of children, and also quite a lot of children had a very high level of caries intensity - 29.73 ± 0.90 %.

The examined children of Chinaz district of Tashkent region mainly had a very high level of caries intensity – 44.44 ± 0.99 % of children, while the examined children of Yangiyul mainly had an average level – 60.0% of children.

Thus, the analysis of the intensity of dental caries in different regions of the Tashkent region showed rather contradictory data: a very high level of intensity was revealed in the Tashkent (47.62 ± 1.50 %) and Chinaz districts (44.44 ± 0.99 %), in the Akkurgan district, the lowest level of caries intensity was revealed in children (48.65 ± 1.14 %) and in 60.0% of the examined children The average level of dental caries intensity has been established in the Yangiyul district.

We conducted a comparative analysis of the inflammation index in children of the Far East in the regions of the Tashkent region.

Table 15

The PMA index in children of the Far East of Tashkent region

PMA index criteria	PMA indicator			
	Tashkent district	Akkurgansky district	Chinaz r/n	Yangiyulsky district
Mild degree ≤ 30%	-	-	(5) 11.11±0.50	
Moderate gingivitis 31-60%	(14) 66.67±1.78	(21) 56.76±1.24*	(28) 62.22±1.17*•	(2) 13.33±0.94*• -
Severe gingivitis 61% and above	(7) 33.33±1.26	(16) 43.24±1.08*	(12) 26.67±0.77*•	(13) 86.67±2.39*• -

Note : (n) – absolute values; * - P <0.05 reliability relative to the indicators of children in the Tashkent district; • - P <0.05 reliability relative to the indicators of children in the Akkurgan district; - P <0.05 significance relative to the indicators of children in the Far East of China district

The obtained results of statistical analysis of the inflammation index or the degree of gingivitis showed that the children examined by us in the Far East of Tashkent, Akkurgan and Chinaz districts mainly had a moderate degree of inflammation, while it was most pronounced in Tashkent district (66.67±1.78%), 1.17 times less in Akkurgan (56.76±1.24%), and 1.17 times less in Chinaz (62.22±1.17%). 1.07 times less than in Tashkent (P<0.05). In Yangiyul district, the children we examined mainly had severe gingivitis (86.67 ±2.39%) (P<0.05), and severe gingivitis was also quite common in Akkurgan district (43.24 ±1.08%).

Thus, according to the results obtained in preschool children of the Tashkent region, examined by us, it is shown that the majority of them have moderate and severe degrees of periodontal inflammation.

We also conducted a comparative analysis of the dental care level indicator (DCI). Using the DCI+DCI and DCI index components, we can not only assess the dental health of a person or different population groups, but also analyze how fully dental care satisfies the need for treatment. The analysis of the obtained data in the general group of examined children of the Far East of the Tashkent region showed that 31 (26.27±2.39%) children had a poor level of dental care, 57 children (48.31±0.64%) had an insufficient level, a satisfactory level was observed in 14 children (11.86±0.32%) and 16 (13.56±0.34%) children had good dental care. help.

Thus, the conducted studies revealed a low level of dental care in the region.

Table 16

Dental care level index in Tashkent region

USP index criteria	USP indicator			
	Tashkent district	Akkurgansky district	Chinaz r/n	Yangiyulsky district
bad level From 0 to 9%	(6) 28.57±1.16	(8) 21.62±0.76*	(13) 28.89±0.80	(4) 26.67±1.33
insufficient level 10-49%	(12) 57.14±1.64	(14) 37.84±1.01*	(23) 51.11±1.06*•	(8) 53.33±1.88•
satisfactory level 50-69%	(3) 14.29±0.82	(4) 10.81±0.54	(5) 11.11±0.50*	(2) 13.33±0.94•
good level above 70%		(11) 29.73±0.90	(4) 8.89±0.44•	(1) 6.67±0.67•

Note: (n) – absolute values; * - P <0.05 reliability relative to the indicators of children in the Tashkent district; • - P <0.05 reliability relative to the indicators of children in the Akkurgan district; ‑ P <0.05 significance relative to the indicators of children in the Far East of China district

In all surveyed regions, the index of the UPR is assessed as “insufficient”, with a tendency for the UPR to decrease with age from 38.46±1.72% in the group of children aged 4 to 53.57±1.14% and 57.45±1.44% in 5 and 6 year old children examined .

Thus, the assessment of the effectiveness of dental care for the population, carried out using the indices KPU + kp, kpu and USP showed that the level of dental care is unsatisfactory, dental health is sharply reduced, the level of caries intensity is high and the severity of dental pathology increases with age.

Table 1 7

USP index indicator in the group of children studied, depending on age

USP index criteria	USP indicator					
	4 year olds		5 year olds		6 year olds	
	Abs.	%	Abs.	%	Abs.	%
bad level From 0 to 9%	3	23.08±1.33	17	30.36±0.86*	10	21.28±1.21*
insufficient level 10-49%	5	38.46±1.72	30	53.57±1.14*	27	57.45±1.44*
satisfactory level 50-69%	-	-			8	17.02±0.38*•
good level above 70%	5	38.46±1.72	9	16.07±0.21	2	4.26±0.38•

Note : * - P <0.05 significance relative to indicators of 4-year-old children; • - P <0.05 significance relative to the indicators of 5-year-old children

Based on the obtained statistical analysis of dental indicators of dental caries in preschool children in the Tashkent region, we conducted correlation analysis of the dental caries intensity index (KPU + kp, kpu) with the hygienic condition of the oral cavity according to the hygiene index (GI), with the oral hydrogen index (pH) and c fluopa level (F) saliva of the examined children .

Table 18

Scheme for assessing the correlation relationship using the correlation coefficient

The power of connection	Direction of communication	
	direct (+)	reverse (-)
Strong	from + 1 to +0.7	from - 1 to - 0.7
Average	+ 0.699 to + 0.3	from - 0.699 to - 0.3
weak	from + 0.299 to 0	- 0.299 to 0

The conducted correlation analysis of the relationship between KPU + kp, kpu with GI showed a weak correlation relationship (r = 0.16), which indicates that for our examined children, existing dental caries had a weak correlation relationship with the hygienic condition of the oral cavity of the examined children .

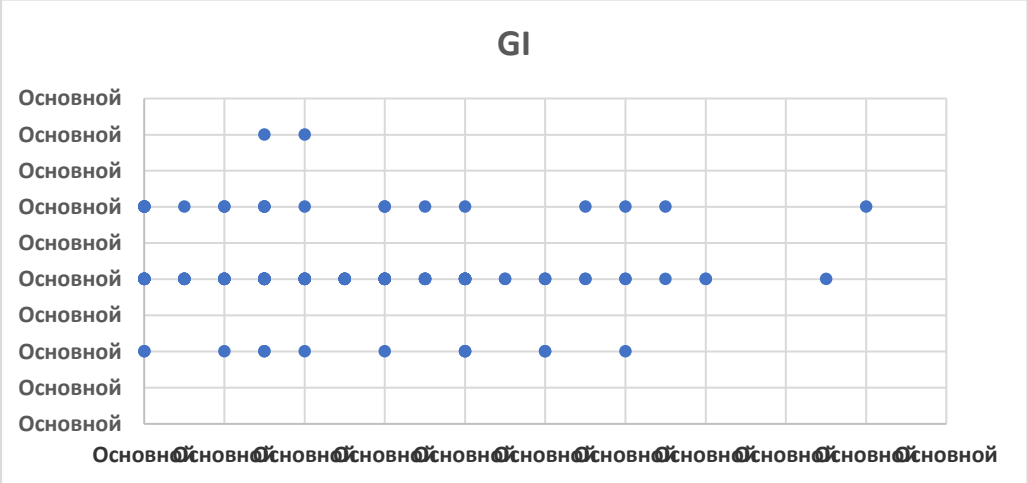


Fig. 10. Correlative relationship between caries intensity and GI in preschool children Tashkent region

Correlation analysis of the relationship between the index KPU+KP, KPU with the level of the hydrogen indicator of the examined preschool children in Tashkent The area also showed a weak correlation (r = + 0.14), which also indicates that the hydrogen index level did not have a significant effect on the development of dental caries in our examined children.

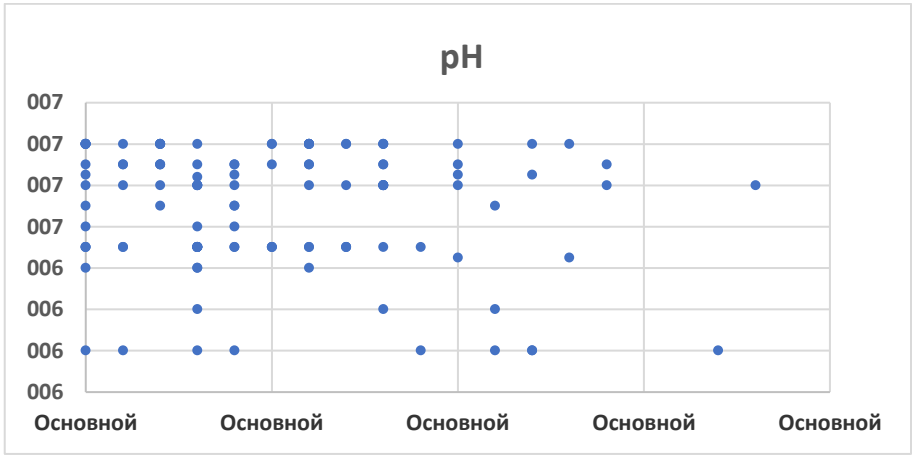


Fig. 11 Correlative relationship between caries intensity and saliva pH of preschool children Tashkent region

In our correlation analysis of the relationship between KPU+kp, kpu with the concentration of fluorides in saliva, we revealed a direct, strong and reliable correlation equal to r=0.81, which indicates that in the examined children of the Far East of Tashkent region, the development of caries is associated with the lack of a sufficient level of fluoride in the saliva of the children we examined.

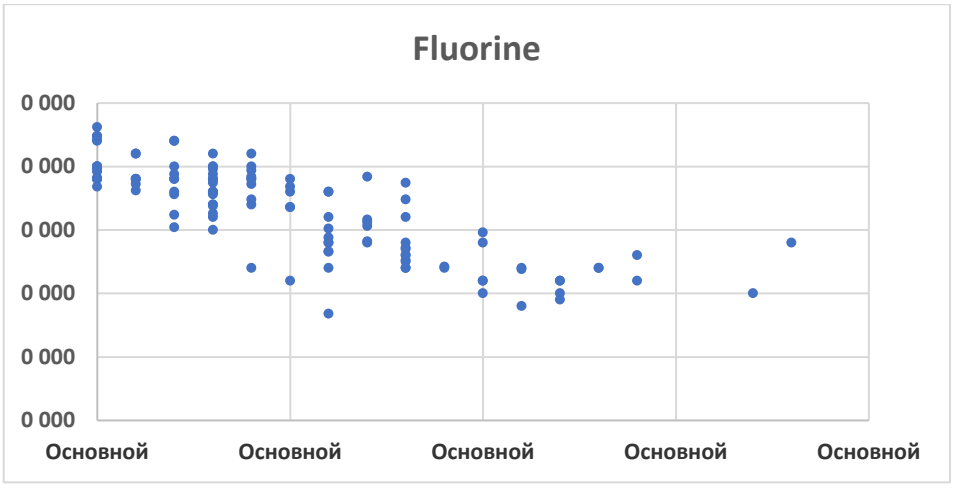


Fig.12 Correlative relationship between caries intensity and salivary fluoride in preschool children Tashkent region

We analyzed the correlations with the index of hygienic condition, with the content of fluoride and the hydrogen index in the saliva of the examined preschool children according to regions of the Tashkent region.

Table 19

Correlative relationships of the caries intensity index in preschool children in the Tashkent region

indicators	Tashkent district	Akkurgansky district	Chinaz r/n	Yangiyulsky district
GI index	0.38	0.37	0.11	**0.70**
Fluoride in saliva	0.62	**0.91**	**0.79**	**0.93**
pH of saliva	0.13	0.17	0.04	0.50

Note : strong: **±0.7** to **±1** ; average: ±0.3 to ± 0.69 ; weak: 0 to ±0.29

The conducted correlation analysis showed that the index of dental caries intensity in preschool children with the index of hygienic condition had a high correlation relationship in children of the Yangiyul district (r=0.70) of the Tashkent region, the average correlation relationship was found in children of the Tashkent (r=0.38) and Akkurgan districts (r=0.37).

Correlative relationship of dental caries intensity index in preschool children of Tashkent region with fluoride content in saliva showed a high correlation relationship among children from Akkurgan (r= 0.91), Chinaz (r=0.79), Yangiyul (r=0.93) districts and a medium correlation relationship with Tashkent district (r=0.62).

Correlative relationship of the dental caries intensity index in preschool children of the Tashkent region with the acid-base balance The state of saliva had only an average correlation with the hydrogen index in the group of examined children from the Yangiyul district (r=0.50).

The obtained results once again confirm that dental caries is a multifactorial disease, which is most pronounced in children of the Yangiyul district of the Tashkent region.

According to the results of the conducted research, it was established that the prevalence of dental diseases in the Republic of Uzbekistan is high. The value of the level of caries intensity from day to day continues to grow from "average" to "high", approaching "very high" in a number of regions. The high level of periodontal disease among those examined also continues to increase with age

from "risk of disease" to "severe degree" of disease. According to the USP, it has been established that the level of dental care provided to the population is low. At the same time, the conducted correlation analysis allowed us to identify a direct, strong and reliable correlation between the intensity of dental caries and the lack of fluoride in saliva .

Hygienic assessment of drinking water from various sources in the Tashkent region.

The intake of optimal amounts of fluoride has a significant impact on the increase in the prevalence and intensity of dental caries, especially in children during the period of tooth formation. We know that in many areas of Uzbekistan the content of fluoride in drinking water is less than half of the optimal dose, therefore one of the main methods of preventing dental caries should be the use of fluoride-containing products.

High rates of prevalence and intensity of dental caries in children in different countries and regions, with different environmental conditions, dictate the need for a comprehensive study of risk factors, both socio-hygienic and medical-biological.

For the prevention of dental caries, the most practical significance is given to 3 risk factors for the occurrence of caries: dental plaque and its microorganisms, excess sugar in food, and fluoride deficiency in drinking water and food. In a certain way, by influencing these factors, it is possible to completely prevent the development of dental caries or reduce the intensity of the disease in children and adults. The greatest effect of prevention is observed with simultaneous influence on all 3 factors. In practice, this approach is called “comprehensive prevention.”

The etiological factors of caries are diverse, poor oral hygiene, excessive carbohydrate consumption, which reduces caries resistance in children. However, another group of authors believes that resistance to caries after the eruption of primary and pePMAnent teeth and in the first years of life is associated with the concentration of fluoride in the consumed water.

In the presence of a number of microelements-accelerators, the most popular of which is fluorine, the processes of mineralization and remineralization proceed more effectively: their speed increases, which leads to the formation of less soluble crystals than the original ones, a qualitative change in enamel apatites occurs (magnesium, chlorine and hydroxide ions are exchanged with fluorides).

Various theories about the anti-caries action of fluorine are being developed, presented by a number of authors, in particular the theory put forward by Dean et al., fluorine ions enter the lattice of hydroxyapatite $Ca_{10}(PO_4)_6(OH)_2$ with the formation of fluorohydroxyapatite $Ca_{10}(PO_4)_6(OH)F$, which is more acid-resistant. WHO resolutions emphasize the role of fluorine in the prevention of caries. Optimal fluoride content in drinking water results in more active passage of calcium ions into the human body, also fluorine interacts with enamel hydroxyapatite crystals, forming acid-resistant compounds, which helps to reduce enamel permeability and strengthen the microcrystalline lattice. Fluorine has bactericidal properties and reduces the enzymatic activity of microbes.

The amount of fluorine in water is described as follows (E.A. SATYGO):

- 1) Very low level – up to 0.3 mg/l.
- 2) Low levels – from 0.3 to 0.7 mg/l.
- 3) The standard (optimal) level is from -0.7 to 1.1 mg/l.
- 4) High, but 8520/F permissible level from -1.1 to 1.5 mg/l
- 5) Fixed high level from -1.5 to 2 mg/l.
- 6) High level – from 2 to 6 mg/l,
- 7) Very high levels from -6 to 15 mg/l

Table 20

Drinking water in some areas of Tashkent region

F-concentration (M±m, mg/l)

District/city	F^- mg/l, M±m
Tashkent district	0.270 ± 0.01
Yangiyulsky district	0.107 ± 0.01
B o s t o n l i k	0.26 ± 0.03
Parking	0.234 ± 0.02
Angren	0.18 ± 0.01
Yukori-Chirchik	0.102 ± 0.01
Beech	0.115 ± 0.01
Nurafshan	0.27 ± 0.01
Bekabad	0.412 ± 0.01
Pskent	0.175 ± 0.01
Ohangaran	0.158 ± 0.01
Chinaz	0.168 ± 0.01
Almalyk	0.244 ± 0.01
Akkurgan	0.227±0.004

The obtained results of the study of fluoride concentration in drinking water of the Tashkent region showed a low level in all surveyed objects, from the lowest indicators in the Yukori-Chirchik district (0.102 ± 0.008 mg / l), to the highest level of F concentration in drinking water in the Bekabad district (0.412 ± 0.01 mg / l) , but all these indicators were in the range of the very low category. and low concentrations of fluoride in drinking water.

Very high intensity of dental caries, according to the criteria given in Table 3.21, in Tashkent (6.48±1.33) and Chinaz (8.56±0.61) districts, as well as prevalence of 100% and 97.78%, respectively. In Chinaz district (0.168±0.01 mg/l) the concentration of fluoride is lower than in Tashkent (0.27±0.01 mg/l). According to the criteria of fluoride level given in Table 3.21, the concentration of fluoride in drinking water and saliva corresponds to a very low level.

Table 21

Dental status of preschool children in the districts of Tashkent region

Indicator	Tashkent (21)	Akkurgansky (37)	Chinese (45)	Yangiyulsky (15)
KPU±kp (kp)	6.48±1.33	4.51 ± 0.76	8.56±0.61	5.33±1.0
Prevalence of dental caries (%)	100	70.27	97.78	93.33
Fluoride in saliva	0.02±0.002	0.02±0.001	0.02±0.001	0.02±0.001
Fluoride in drinking water	0.27±0.01	0.227±0.01	0.168±0.01	0.107±0.01

Thus, a comparative analysis of the relationship between the intensity and prevalence of dental caries in children and the concentration of fluoride in drinking water by region showed the same pattern as the indicators in the general group (n=118), i.e. low fluoride concentration in drinking water and saliva of the examined children in the Far East correspond to high indicators of the intensity and prevalence of dental caries in preschool-age children. Tashkent region.

Thus, the results of the research provide grounds to assume the role of low concentrations of fluoride in drinking water in the development of dental caries in children of the Tashkent region.

In all districts of Tashkent region, the prevalence of dental caries in accordance with the low content of fluoride in drinking water showed very high results: 100% in Tashkent district, 70.57% in Akkurgan district, 93.3% in Yangiyul and Chinaz districts and 97.78% in Yangiyul and Chinaz districts.

Dental status of preschool children against the background of the use of a complex of caries-preventive measures using iodinated-fluorinated salt

Fluorides effectively prevent the development of dental caries. It has been proven that endogenous use of fluorides during the period of tooth formation and mineralization contributes to saturation of enamel with hydroxyfluoroapatites, as a result of which its resistance to dental caries increases.

To achieve the goal and solve the tasks set, we examined all 118 children attending children's educational institutions of the Tashkent region and pePMAnently residing in this region. The children were divided into 2 groups - Group 1 - the main - consisted of 75 children and Group 2 - the control - 43 children. In each district where the research was conducted, we researched two preschools, one for the control group and one for the prevention group.

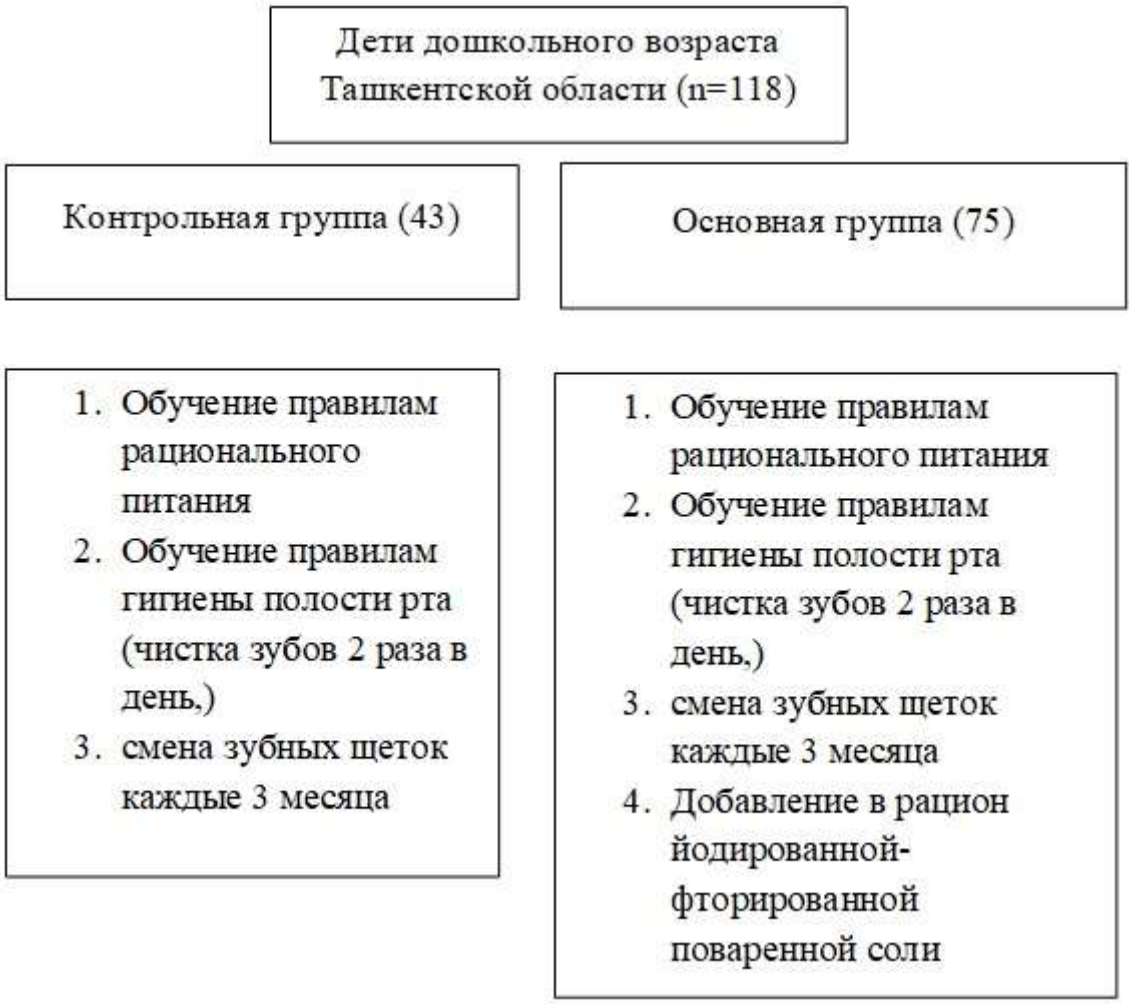


Fig. 13 Complex of caries-preventive measures

As a result of the research, a set of caries-preventive measures was developed for preschool-aged children living in the Tashkent region (Fig. 13). In

accordance with it, both the control and preventive groups of preschool-aged children living in the Tashkent region were explained the rules of oral hygiene, conversations were held with parents, and rational nutrition of children was started in preschool educational institutions. For the preventive group, in addition to the above measures, iodinated-fluorinated table salt was added to the diet. The complex of caries-preventive measures we propose was developed specifically for children attending pre-school educational institutions, consisting of the following stages:

Hygienic anamnesis: when, how many times a day, what and how the child brushes teeth. Determination of the initial GI and PMA indices. Comparison of the obtained indicators made it possible to determine the nature of the individual approach to the hygienic training and upbringing of the child. As a result of preventive examinations conducted among children in pre-school educational institutions, all children needed special individual training in hygiene skills and thorough, regular monitoring of the quality of oral hygiene care.

2. Oral cavity sanitation, which included treatment of carious teeth and professional teeth cleaning to remove soft and hard dental deposits using special instruments

3. Selection of individual oral care products - toothbrush and toothpaste according to age criteria.

4. Teaching the child the standard method of brushing teeth.

During the study, the children were visually shown the correct method of brushing their teeth on special jaw models. According to this method, the dental row is conditionally divided into segments - frontal teeth (incisors, canines) and chewing teeth (molars) on each side. The toothbrush is placed at an angle of 45° to the tooth surface and brushed with open dental arches, brushing is performed with 10 sweeping movements from top to bottom, starting with the anterior vestibular surface of the upper jaw, then the palatine surface is brushed with the same movement in the same quantity. On the lower jaw, brushing is performed in the same sequence, each 10 sweeping movements. The teeth on the lower jaw were brushed in the same sequence. When brushing the palatal and lingual

surfaces of the upper and lower jaws, the brush was positioned perpendicular to the dental arch, with the handle down on the upper jaw and with the handle up on the lower jaw. Brushing all teeth is completed with circular movements, moving the brush from left to right, and it is necessary not to forget about brushing the gums. The duration of brushing is 3-5 minutes. All children in the preventive groups were recommended to brush their teeth 2 times a day.

5. After completing the personal hygiene procedure, it was necessary to wash the toothbrush and rinse the mouth.

Salt - edible iodized-fluorinated

Iodized fluorinated table salt was distributed to the kitchens of preschool educational institutions where preventive groups were involved, and it was introduced into the children's diet at a rate of 5 g per day. We have developed iodized-fluorinated table salt ROYAL "Fluor+" obtained by adding potassium iodate in the amount of 40+-10 mg / kg and potassium fluoride in the amount of 250+-50 mg / kg.

In the course of research it was established that on average 5-year-old children spend approximately 8-9 hours in pre-school educational institutions, and during this time they noPMAlly eat 4 times a day, with the use of 3 g of iodinated-fluorinated salt with a fluoride ion mass fraction of 250 mg / kg. Thus, these children receive approximately 0.75 mg of additional fluoride daily. Therefore, when using iodinated-fluorinated salt of this concentration, the actual intake of fluoride may be 1.15 mg/day, which will correspond to the average daily fluoride intake values recommended for this age group.

We have carried out a comparative analysis of the main indicators of the dental status of preschool-aged children in the main and control groups before preventive measures and after the use of fluorinated salt in children in the main group.

In the dynamics of the study, every 6 months for 1 year, we carried out a comparative assessment of the clinical effectiveness of caries preventive measures for the increase in the prevalence and intensity of dental caries. The influence of

preventive measures on the properties of oral fluid was judged by the dynamics of changes in pH values, by changes in the content of fluoride in saliva.

Data on the dynamics of the prevalence of dental caries in children of the Far East under the influence of the use of caries-preventive measures are presented in Table 21.

Table 22

Dynamics of changes in the dental status of preschool-aged children of the main group against the background of caries-preventive measures using iodized-fluorinated salt (M±m)

Indicator	Main group (n = 75)	In 6 months.	In 1-2 months.
CPU+kp (kp)	6.43 ±0.51	7.40 ± 0.50	7.77±0.51
KPup+KPP	8.23 ±0.66	9.46 ±0.76	9.93±0.80
PMA	56.69±2.01	50.51±1.25*	43.98±1.40*
GI	2.04±0.06	1.97±0.11	1.92 ± 0.10
Prevalence of dental caries	9 4 ,67 %	9 6 %	96 %

Note: *- P<0.05 significance relative to values before fluoridated salt intake: • - P<0.05 significance relative to intake values 6 months of fluoridated salt

As can be seen from Table 22, the prevalence of dental caries among preschool-aged children of the main group, 6 months after taking iodinated-fluorinated salt, was 96%, the increase in the prevalence of caries was 1.33%. Under the influence of caries-preventive measures using iodized-fluorinated salt, the prevalence of dental caries did not change during the year; the prevalence of dental caries increased in 12 months amounted to 1.33%.

The intensity of caries in children of the main group before caries preventive measures was on average 6.43±0.51 for boys and girls (KPP=8.23 ±0.66), after 6 months this indicator increased to 7.40±0.50 and after 12 months it was 7.77±0.51. We have established that the increase in caries intensity in the main group after caries preventive measures was 1.34 units.

In children of the control group, before the start of the study, the prevalence was 79.06%, after 6 months the prevalence of dental caries among preschool-aged

children of the control group was higher (95.34%), later after 12 months the prevalence was 98% and the increase in the prevalence of the control group after a year was 19%.

The intensity of caries at the beginning of the study was 4.35±0.59 (KPP=5.77 ±0.79), after 6 months 6.56±0.56, after 12 months this indicator stopped at the level of 7.51±0.60. The increase in intensity for this group was 3.16 units. (Table 23)

Table 23

Dynamics of changes in the dental status of preschool-aged children in the control group after a set of caries-preventive measures (M±m)

Indicator	Control (n = 4 3)	After 6 months (n = 43)	After 12 months (n = 43)
CPU+kp (kp)	4.35±0.59	6.56± 0.56 *	7.51± 0.60 *
KPup+KPP	5.77±0.79	8.71±1.21	9.97±1.38
PMA, %	59.28±3.16	58.48±2.09	54.59±2.10
GI	2.05±0.59	2.00 ± 0.17	1.98 ± 0.19
Prevalence of dental caries	79.06 %	95.34 %	98 %

Note : *- P< 0.05 significance relative to values before fluorinated salt **consumption**

Thus, the increase in caries intensity of preschool children of the main group was 1.34 units, and for the control group, respectively, 3.16 units. Based on these data, it can be assumed that the reduction in caries intensity for preschool children of the Tashkent region after caries preventive measures was 57.5%.

Comparative analysis of the hygiene index according to Fyodorov-Volodkina in children of the prophylactic and control groups, which are presented in Tables 4.1 and 4.2. As can be seen from the tables, in the prophylactic group before the use of fluorinated salt, the GI was 2.04 ± 0.06, in the control group - 2.05 ± 0.59 . The hygienic condition of the oral cavity was satisfactory in both groups. After 6 months, the oral GI in children of both groups improved by decreasing to 1.97 ± 0.11 and 2.00 ± 0.17, respectively . After 12 months, this indicator continued to decrease to 1.92 ± 0.10 in the subjects of the main group and to 1.98 ± 0.19 in the comparison group, corresponding to the satisfactory GI

criterion. The dynamics of GI in both the control and main observation groups was insignificant (P>0.05) and remained at a satisfactory level.

To assess the condition of the soft tissues of the periodontium, indicators characterizing the state of gum inflammation were studied.

As can be seen from Tables 4.3 and 4.2, in children of the preventive group, the PMA index before the use of caries preventive measures, after 6 months and 12 months of observation was 56.69 ±2.01; 50.51 ±1.25 and 43.98 ±1.40 , respectively, which corresponded to the average degree of gingivitis, in the comparison group - 59.28 ±3.16; 58.48 ±2.09 and 54.59 ±2.10, respectively, i.e. Moderate gingivitis was observed. A significant decrease in the degree of inflammation was observed in the main group during the observation period (P<0.05), while in the control group an insignificant decrease was observed (P>0.05).

Thus, within 12 months. In children of the preventive group, there was no increase in the prevalence and intensity of dental caries, a satisfactory level of the hygiene index and an average severity of periodontal inflammation, while in the control group without the use of fluoridated salt, there was an increase in the prevalence of caries to 98%, a reliable increase in the intensity index to 7.51 ± 0.60 (P < 0.001).

After one year of implementing the program, when analyzing the results of examination of children, it was established that the level of sanitary and hygienic knowledge in both groups of children had increased.

The answers to the question “How often do you change your toothbrush?” children changing their toothbrush every 3 months in the main group after 6 months of the study were 95%, after 12 months - 89%.

To the same question "How often do you change your toothbrush?" At a repeat examination after 6 months of the control group of children, 70% changed their toothbrush every 3 months, 16% at 4 months, 14% at 6 months. A year later, at a repeat survey of children changing their toothbrush: after 3 months - 63%, after 4 months - 23%, after 6 months - 14%. The results of toothbrush replacement in the control group decreased. (Fig. 14)

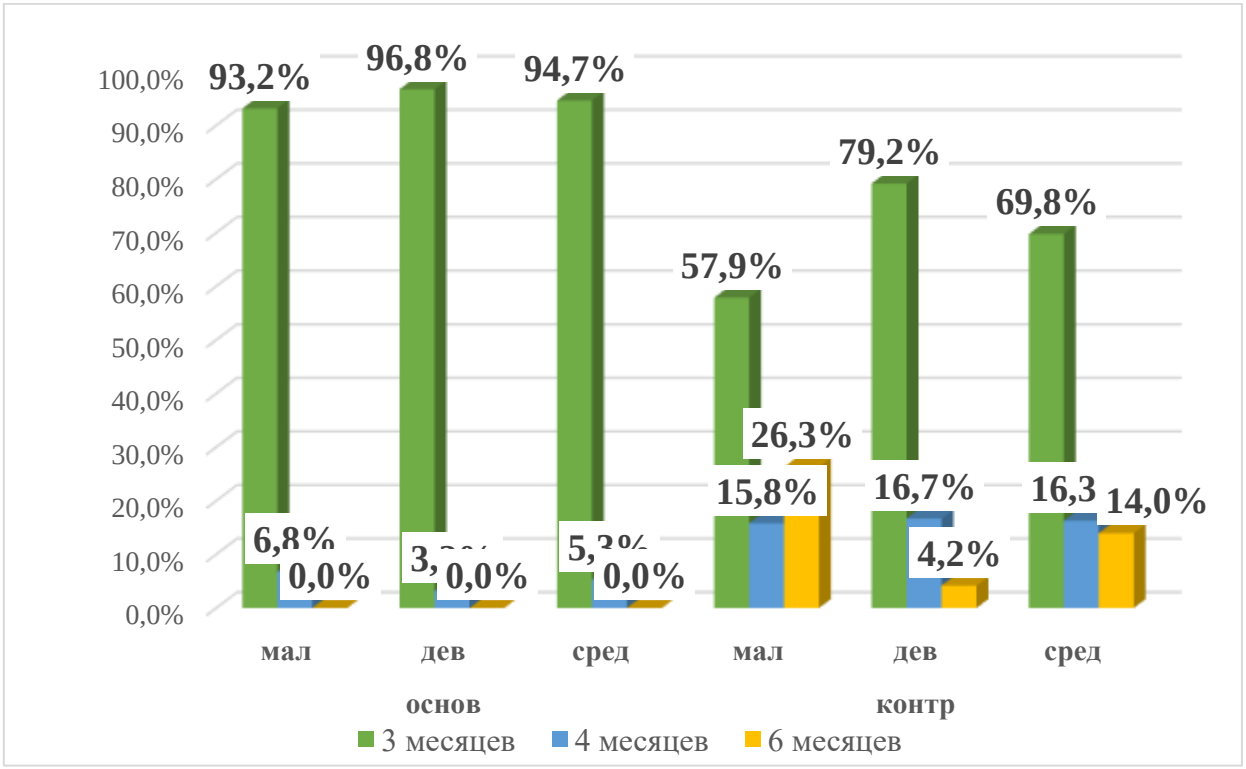
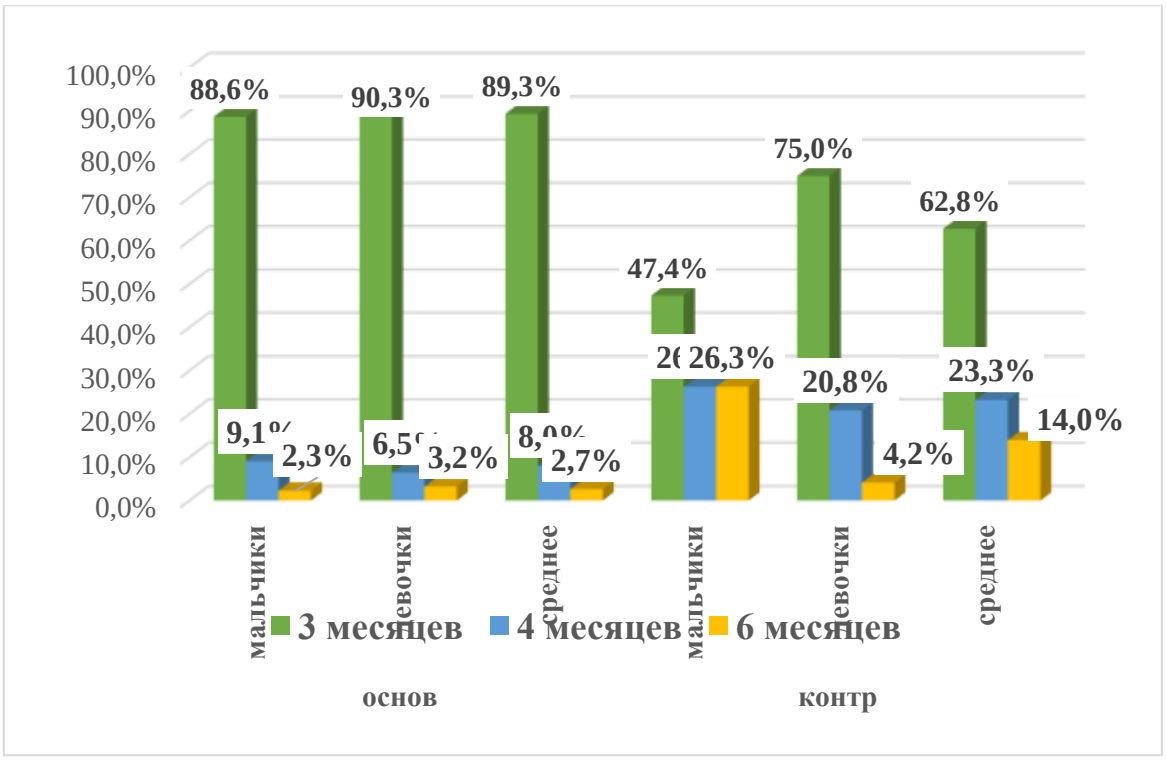


Fig. 14 Dynamics of changes in the timing of toothbrush changes in the main and control groups after 6 months against the background of dental caries preventive measures



T a b . 15 Dynamics of change gigi e nich ec ki x n a off o in d e t e y d o school flax o g o in o z pac t a T a shk e nt c o y o b l a c ti . Cpo ki c m e n dental x sh e t o k oc n o v o n o y And k o nt po flax x g p pack in 12 months against the background of preventive measures

A study of the answers to the question "How many times a day do you brush your teeth?" showed that the number of children brushing their teeth twice a day at the beginning of the survey was 58.1%, and once a day - 41.9%. In the main group (Fig. 15), during a repeated survey after 6 months, it was noted that the number of children brushing their teeth twice a day increased to 96%, and the number of children brushing their teeth once a day was 4.0%.

The number of children who brush their teeth irregularly decreased to 0%. After a year, the number of children who brush their teeth twice a day was 93.3% (Fig. 15), and those who brushed once a day was 6.67% per day during the repeated examination. The percentage of children who brushed their teeth irregularly did not change and was 0%. The survey showed that all children brushed their teeth regularly. When analyzing the questionnaire of the control group, the number of children brushing their teeth twice a day was 50.0%, and once a day – 50.0%. When repeated after 6 months (Fig. 16), the number of children brushing their teeth twice a day increased to 45.8%, once a day to 54.2%. The number of children brushing their teeth irregularly decreased to 0%. A year later (Fig. 17), when a repeat survey was conducted, the number of children brushing their teeth twice a day decreased to 45.8%, and once a day to 50.0%. The number of children brushing their teeth irregularly was 4.17%.

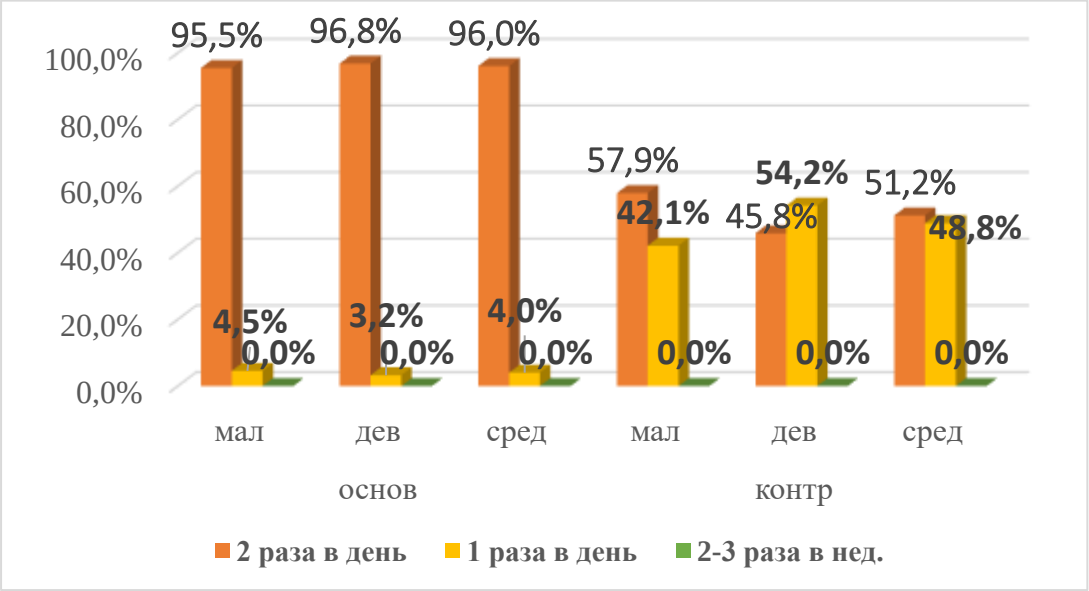


Fig . 16 Frequency of brushing teeth of children of the main and control groups of preschool age in the Tashkent region after caries-preventive measures after 6 months

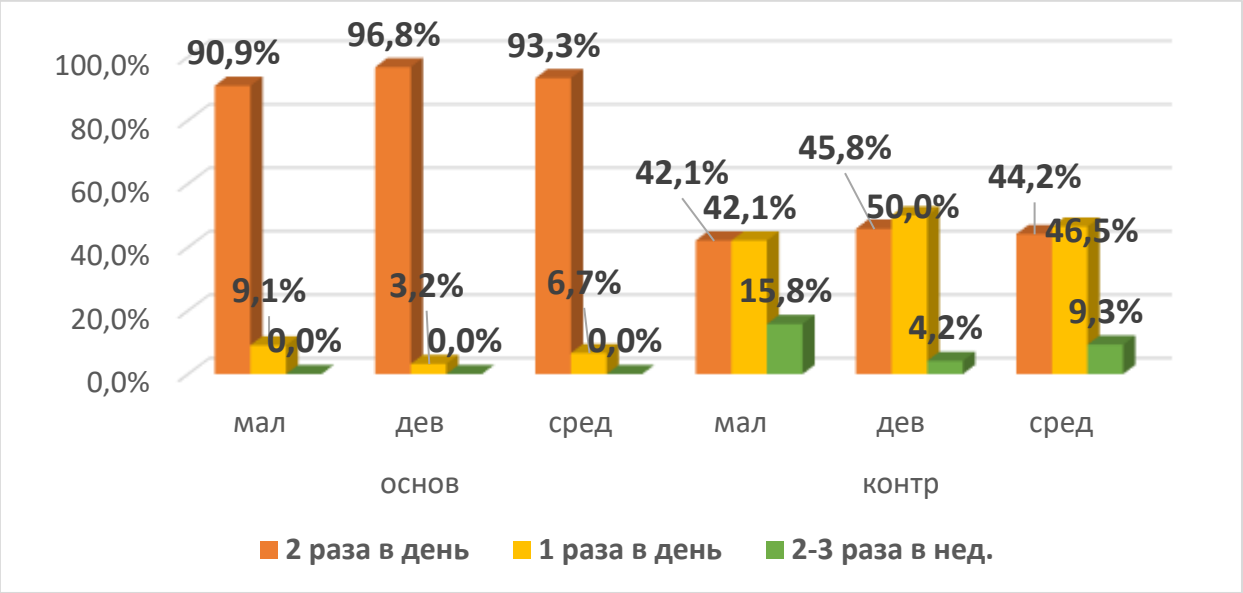


Fig. 17 Frequency of tooth brushing in children of the main and control groups of preschool age in the Tashkent region after caries-preventive measures after 12 months

As a result, the results of the survey of parents and children of the main and control groups showed that after the use of caries-preventive measures for 1 year, an improvement in the level of dental knowledge in children was noted.

The obtained data showed that the educational work carried out during caries prevention measures, carried out in preschool children from 4 to 6 years old, was effective.

Calculation of children's diet with the inclusion of iodized-fluorinated salt

Almost all food products of plant and animal origin contain minimal, trace amounts of fluoride - at a level of 2–20 mgF/kg.

It was found that sea fish contains a large amount of fluoride, and this indicator is also preserved in fish products: canned food, smoked meats, etc. (from 1 to 14 mgF/kg). Seaweed contains 6-14 mg F/kg. In krill paste (crustaceans), prepared together with the shell, the fluoride level is 200-435 mgF/kg.

The level in food changes significantly when food is cooked. The main changes are related to the contribution of fluoride from water used for the preparation of food, especially beverages and dry foods, such as powdered infant formulas, to which water is added before consumption: depending on the fluoride content of the water, infant formula prepared on the basis of dry cereals contains

0.01–0.1 or 0.1–1.7 mgF/l (this difference is even more significant that breast milk contains 0.005–0.01 mgF/l) .

The cooking method affects the nutrient content of food, as well as the fluoride content: when boiling, approximately 2-46% of fluorides can precipitate, which means that by the time food is finally cooked, we lose approximately 60% of fluorides.

In an experiment conducted to study the fluoride balance in adult men and which made it possible to estimate fluoride intake not speculatively, but in fact (through strict control of water and food intake, ashing of products, etc.), McClure determined that various daily food sets of an adult man contain about 0.5 mg of fluoride, the “water” part of the fluoride load is provided by the consumption of 1 liter of water (in comfortable conditions), which at 1 ppmF in water will provide a daily intake of 1.5 mgF/ /day (or, with an average weight of 20–27-year-old male participants in the experiment 75 кг, 0.02 mg/ /kg). Taking strict account of fluoride excretion by all channels, McClure studied the fluoride balance with an additional 3 mgF (as calcium fluoride, sodium fluoride, cryolite, or bone meal) in the daily diet and concluded that "at 4 and 5 mgF daily intakes no evidence of fluoride accumulation in the body is observed, whereas at a fluoride load of 6 mgF a positive balance is obtained." A fluoride load of 0.05 mgF /kg/day and an intake level of 4 mgF/day /became the basic values for the regulations of daily fluoride load.

In 1992, T. M. Marthaler, while studying the influence of factors on the occurrence of dental fluorosis, found that 20-30% of children have mild forms of fluorosis with a fluoride content in drinking water of 2 mg/l and proposed the so-called "conservative" limits of daily fluoride intake for people of different ages with a lower limit of daily fluoride consumption equal to 1.45 mg and an upper limit reduced by 1.5 times and equal to 2.9 mg. Per unit of body mass, this gives an interval from 0.022 to 0.045 mg/kg. Preventive programs organized in recent decades are oriented towards Marthaler's recommendations.

Table 25

Information from various information sources about fluoride content (mgF/kg, mgF/l) in food products

Products	USA, 1934	Ukraine, 1985	Canada, 1986	Hungary, 1988	Russia, 1990	GePMAny, 1995	Belarus, 2000
Flour	0.4–1.2				0.22–0.40		0 , 91
Groats :	0.3 –0.7						
buckwheat		0.23			0.23		1 , 46
oatmeal					0.84		
barley					0.90		
semolina					0.20		
rice	0.7 –1.0	0.50					1 , 9
soybean	1.3						
Bread :			0.04–1.02	0.06–0.49		0.05–0.39	

wheat	1.0	0.3–0.6					1 , 10
rye		0.35					1 , 59
noodles, pasta	1,2						2 , 11
Sea fish:			0.21–4.57	0.06–1.7			
fresh	1.5–7.0	14.0					4.17
dried	27.2						
canned food	26.9–84.5						
salty		3.8					
Meat:			0.04–1.2	0.01–1.7			
beef	0.2–9.0	0.63			0.63		
pork	0.2–0.34				0.69		1.48
pork fat	3.33						
beef liver	1.5–8.8	2,3			2,3		

lamb	0.2				1,2		
chicken	1.4	0.76					
Egg :	0.00 –2.05	0.55					1 , 66
yolk		0.4–2.0					
protein		0.0–0.6					
Milk :							
fresh	0.04–0.55	0.29	0.01–0.8	0.045–0.51		0.019–0.16	0.36
dry							
cheese		1.6					
butter		1.5					
cottage cheese					0.32		0 , 36
Vegetables :			0.01–0.68	0.28–1.34		0.023	
St. cabbage		0.3–0.5			0,1		1 , 22

potatoes	0.5	0.3			0.3		0.43
salad		0.28–0.8			0.3		
carrots	2,3						
beetroot							0.50
cucumbers							0.43
spinach	2.0	1.0					
beans	2.0						
Mushrooms					0.14		
Fruits :	0.02–2.8		0.01–0.58	0.03–0.19		0.01–0.35	
citrus	0.12–0.51	0.22					
apples	0.52–1.32	0.8					0 , 84
apricots	0.22						
bananas	0.23						1 , 68

cherry	0.25						
Tea:							
dry	100–1000		90–287	243.7			
infusion			4.97			0.37–2.07	
Fresh berries	0.1–0.4						
Орехи:							
almonds					0.91		
Greeks					6.85		
Honey					1.0		
Сахар			0.01–0.28				
Alcoholic drinks	0.0–6.4		0.21–0.96	0.19–0.78		0.003–0.39	

Table 26

Daily intake of fluoride calculated for children living in areas with 1 ppmF in water (McClure)

Age	Body weight, kg	Daily energy intake, kcal	Fluoride intake			
			from drinking water, mg	from food, mg	total from water and food, mg	total from water and food, mg /kg
1-3 years	8–16	1200	0.390 – 0.560	0.027 – 0.265	0.417 – 0.825	0.026 – 0.103
4-6 years	13–24	1600	0.520 – 0.740	0.036 – 0.360	0.556 – ,106	0.023 – 0.085
7-9 years	16–35	2000	0.650 – 0.930	0.045 – 0.450	0.695 – 1.380	0.020 – 0.068
10-12 years	25–54	2500	0.810 – 1.160	0.056 – 0.560	0.866 – 1.725	0.016 – 0.069

In 1949, McClure refined the fluoride content in food (the concentration range narrowed from 0.1–1.0 to 0.2–0.3 pp mF) and confirmed his position regarding the magnitude and value of the optimal fluoride load.

NUTRITIONAL DIET

In preschool institutions of general, specialized, sanatorium type with different periods of stay for children SanPiN RUz N 0016-21

Correct adherence to the regime and diet is the key to a healthy lifestyle, the time of food intake in preschool educational institutions should correspond to the physiological characteristics of children of different ages and should be constant, that is, food intake should be observed regularly at the same time, since in this case children develop a conditioned food reflex for a time. This will ensure the production of sufficient amounts of digestive juice and food will be absorbed more actively. Untimely and disorderly feeding leads to the suppression of the gastro-cellular apparatus, which ceases to function noPMAlly, which leads to a decrease in appetite and a gradual fading of food reflexes.

Children's nutrition should be rational, food intake should be at least 4 times a day at intervals of 3 and 5-4 hours, since in children the process of gastric digestion lasts approximately 3-3.5 hours and by the end of this period children's stomach is emptied and appetite increases. According to WHO, the correct diet for children is:

Breakfast - 8.30 - 9.30

Lunch - 12.30 - 13.30

Afternoon snack - 16.00 - 16.30

Dinner - 18.00 - 18.30

N	Set of products	Time of stay of children										
		3-4.5 hours	until 9 o'clock		9-10.5 h		12 hours		24 hours		Specialized. Sanatorium		Calculation of fluoride concentration. G/kg.(mg) according to Popruzhenko T.V.
		5-7 years	up to 3 years	from 3 to 7 years old	up to 3 years	from 3 to 7 years old	up to 3 years	from 3 to 7 years old	up to 3 years	from 3 to 7 years old	up to 3 years	from 3 to 7 years old	
1	Wheat bread 1st grade, enriched with vitamin and mineral mixture, bun	50	80	100	90	110	90	150	90	150	100	170	
2	Wheat flour 1st grade	-	16	16	16	16	16	25	16	25	20	25	0 , 91 (0.015)
3	Dry jelly	5	5	5	5	5	5	5	5	5	5	5	
4	Cereals, pasta	20	20	30	20	30	30	45	30	45	35	45	2.11(0.06)
5	Caxap	15	30	35	35	40	50	55	50	55	50	60	0.28(0.01)
6	Confectionery products	10	5	8	5	8	7	10	7	10	10	15	
7	Butter	13	13	15	13	15	17	25	17	25	30	35	1.5(0.02)
8	Vegetable oil	-	5	5	5	5	6	9	6	9	6	15	
9	Milk, fermented milk	150	250	250	300	300	300	300	350	350	400	400	0.16 (0.04)
10	Sour cream	-	5	5	5	10	5	10	5	10	20	25	
11	Cottage cheese	-	40	50	40	50	40	50	40	50	50	50	0 , 36 (0.02)

12	Cheese	3	3	5	3	5	3	5	3	5	20	25	1.6(0.008)
13	Meat, poultry	-	60	75	60	100	85	100	85	100	120	150	0.76 (0.06)
14	Fish	-	20	25	20	45	25	45	25	45	25	40	
15	Egg (pcs.) chicken	0.25	0.25	0.5	0.25	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1 , 66 (0.001)
16	Potatoes.	-	100	150	120	200	120	200	120	200	120	150	0.43 (0.06)
17	Vegetables, including tomato paste	-	150	170	150	200	180	200	180	200	150	150	0.28 (0.05)
18	Fruits, berries, juices, vitamin drinks, powdered drinks from dried vegetables and fruits	150	150	150	150	150	150	150	150	150	150	150	0.35 (0.05)
19	Dry fruits, incl. rosehip 5 gr.	10	10	10	10	15	10	15	10	15	15	15	0.25 (0.0025)
20	Tea	0.2	0,1	0.2	0,1	0.2	0,1	0.2	0,1	0.2	0,1	0.2	243.7 (0.05)
21	Cocoa	1	1	1	1	2	1	2	1	2	1	2	
22	Iodized salt	1	2	2	2	5	2	5	2	5	2	5	
23	Yeast	-	1	1	1	1	1	1	1	1	1	1	

Table of replacement of certain products

Product	**Weight (g)**	**Replacement product**	**Weight (g)**
Replace white bread made from first grade wheat flour with:	100	breadcrumbs made from first-grade wheat flour;first-grade wheat flour	65-75
Meat	100	Beef liver	116
		Chickens 1 category	110
		Fish	125

		Cottage cheese	120
Whole milk	100	Dry whole milk in hermetic packaging	11
		Skimmed dry milk	7.5
		Condensed milk with sugar	40
		Cottage cheese	17
		Meat 1 category	14
		Fish	17.5
		Cheese	12.5
		Chicken egg	22
Cottage cheese	100	Meat (beef)	83
		Fish	105
Chicken egg (1 pc.)	41	Cottage cheese	31
		Meat (beef)	26
		Fish	30
		Whole milk	186
		Cheese	20
Fish	100	Meat (beef)	87
		Cottage cheese	105
Potatoes	100	White cabbage	111
		Cauliflower	80
		Carrots	154
		Beetroot	118
		Beans	33
		Green peas	409
		Green peas (canned)	64
		Zucchini	300
Apples fresh	100	Canned apples	200

		Apple juice	90
		Grape juice	133
		Plum juice	133
		Dried fruits:	
		apples	12
		Prunes	17
		Dried apricots	8
		raisin	22
		Vitaminized drink	5

Deviation from the accepted norms of the feeding regimen for children can lead to disturbances in the gastrointestinal tract, although in exceptional cases the time difference can be 20-30 minutes. There are certain standards for the child's time spent at the table; for more active assimilation, eat during the meal, so at breakfast and dinner you need to sit for no more than 20 minutes, at lunch 25-30 minutes, and during afternoon tea - 15 minutes.

Thus, we studied the diet for preschool children according to SanPiN 0016 from 2021 and the list of products containing fluoride calculated according to T.V. Popruzhenko (2010). In preschool children, the daily consumption of fluoride in food products was 0.5 mg / day. and if we take into account that the fluoride content in the water of the region we studied fluctuates within 0.2 mg/l, we can assume that the child receives 0.7-0.9 mg of fluoride per day from food and water. These indicators do not correspond to the recommended daily fluoride intake according to WHO for children aged 4-6 years, which is from 1.45 to 2.9 mg of fluoride per day. Therefore, children aged 4-6 years with an average body weight of 16-20 kg, staying in preschool institutions for 8-9 hours, consuming the iodinated-fluorinated salt offered by us, received 1.55 mgF, i.e. 0.06-0.1 mgF/kg per day, which made it possible to fully satisfy the daily need for fluoride.

Dynamics of changes in the physicochemical properties of oral fluid in preschool children against the background of the use of a complex of caries-preventive measures with salt fluoridation

As a result of our research, it was established that children who took fluoridated salt also experienced qualitative changes in the composition of oral fluid. The hydrogen ion activity index plays an important role in regulating the homeostasis of the mineral components of enamel and oral fluid. It was established that before the start of preventive measures, the concentration of hydrogen ions in the oral fluid of children in the prophylactic group was 6.62±0.04, i.e. the pH of the oral fluid was shifted to the acidic side (Table 27).

Table 27

Dynamics of changes in the physicochemical properties of mixed saliva of preschool children of the main and control groups after the use of fluorinated salt (M±m)

Main group			Control group			
Indicator	Up to (n =75)	After 6 months (n = 75)	After 12 months (n = 75)	Up to (n = 43)	After 6 months (n = 43)	After 12 months (n = 43)
Fluorine (F) (mmol/l)	0.0 2 ± 0.0001	0 , 0 3 ± 0.00 1 *	0 , 0 7 ± 0.00 1 *	0.0 2 ± 0.00 1	0 ,0 2 ± 0,00 1	0 ,0 2 ± 0,00 1
Ph	6, 62 ± 0,04	6.87 ± 0.0 2	7 , 18 ± 0.0 2	6, 82 ± 0,0 3	6.85 ± 0.0 3	6.91 ± 0.03

Note : *- P < 0.05 significance relative to values before consumption of fluoridated salt: • - P < 0.05 significance relative to indicators of consumption 6 months of fluoridated salt

Six months after the start of taking fluoridated salt, alkalization of the oral fluid was observed and the concentration of hydrogen ions changed significantly and amounted to 6.87 ± 0.02 (P < 0.05); after a year, the concentration of hydrogen ions amounted to 7.18 ± 0.02 and the pH approached neutral (P < 0.001). Analysis of the concentration of hydrogen ions in the prophylactic group revealed a significant increase in the concentration of hydrogen ions.

By the end of the year, in children in the prophylactic group, the pH was 7.18±0.02, and in the comparison group 6.91±0.03 (Table 27) (p < 0.001).

We studied the concentration of fluoride in the oral fluid of children with bronchial asthma and changes in these indicators under the influence of fluorinated salt intake. Table 5.5 presents the initial average values of fluoride concentration in the oral fluid of children in the prophylactic group. They were: 0.02 ± 0.0001 mmol/l fluoride. After 6 months. After the start of preventive measures, the concentration of fluoride in the oral fluid increased significantly and amounted to 0.03 ± 0.0001 mmol/l fluoride ($p<0.001$). One year after the start of preventive measures, the concentration of fluoride amounted to 0.07 ± 0.001 mmol/l ($p<0.001$) (Table 26).

We compared the data obtained for the children in the prophylactic group with the data for the children of the same age in the control group. Significant differences in the concentration of fluoride ions were noted in different groups of children (Table 27). Thus, in the prophylactic group, the concentration of fluoride ions was 0.07±0.001 mmol/l, and in the control group 0.02±0.001 mmol/l ($p<0.001$).

Thus, the study of the dynamics of fluoride concentration and the activity index of hydrogen ions in the oral fluid in the main group using fluoridated salt for 6 and 12 months showed a significant increase in fluoride (0.03 ± 0.001 and 0.07 ± 0.001, with initial values of 0.02 ± 0.001, $P <0.001$), while in the group without the use of fluoridated salt there was no dynamics.

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