



Research Article

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Development Factors in Dentoalveolar Anomalies Influencing Patients in The Zone of Environmental Woes

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Abstract

The article contains the findings of the analytical research on the dentition anomalies in the patients of preschool and school age in Kizlyar, the revealing of the main factor affecting the development of abnormalities in a dentition. It also presents the statistical data on the periodontal disease affecting the prevalence rate and development of anomalies; the paper also describes the need of the city for the provision of dental care.

Keywords: Caries, The intensity of the lesion, Dentofacial abnormalities, Malocclusion

Topicality

According to the state report "On the state sanitary-and-epidemiologic wellbeing of the population in the Republic of Dagestan in 2015", when analyzing and ranking by municipalities of the Republic of Dagestan, the highest mortality rates are registered in the cities of Kizlyar (7.2), Dagestanskiye Ogni (7.6), and Buinaksk (6.1). The lowest mortality rates are recorded in the cities of Makhachkala (3.5), Izberbash (4.4), Khasavyurt (4.1), Kaspiysk (3.9), as well as in Botlikh (4.3), Akhvakh (4.7), Untsukul'sky (4.8), and Tsuntinsky (4.4). regions. When ranking the causes of mortality, it was established that the leading position in its structure belong to

cardiovascular diseases - 40.8%, as it was seen in previous years. In the list of the main causes of mortality it is followed by oncological diseases (14.2%), respiratory diseases (10.6%), external causes of mortality (8.5%), digestive diseases (3.9%), diseases of the endocrine system (3.4%), diseases of the genitourinary system (3.2%), diseases of the nervous system (3.0%), some infectious and parasitic diseases (0.9%) [1-4]. The general socioeconomic status of the population takes an important place in the list of various factors contributing to the development of dental caries and the prevalence of dentoalveolar abnormalities along with the natural and climatic conditions in the area.



The level of dental health of the population, regardless of the development of society, is still extremely low and amounts to only 10.0 - 25%. According to the socio-economic status and standards of living, the Republic of Dagestan occupies extremely low position and, respectively, the dental health awareness of the population requires great efforts and educational activity [5-8]. The aspects of population dental health in the Republic of Dagestan were actively studied 20017-2018, but no studies have yet been conducted on the correlation between the dental health of the population in the region and the environment: water, soil, and air.

In our research, it was of significant interest to clarify the correlation between caries, anomalies of the dentition and occlusion in the population of Kizlyar city and the Kizlyar district of the Republic of Dagestan.

The Aim of Research

To study the influence of arsenic and fluorine in drinking water on the prevalence of caries, anomalies of the dentofacial system and occlusion among the population of the northern regions in the Republic of Dagestan.

To achieve the set aim it was necessary to accomplish the following tasks:

- To assess the quality of drinking water in a centralized water supply system in Kizlyar
- To calculate sanitary-chemical and microbiological indicators for drinking water
- Compare water quality and risk for people's health, contributing to the development of dentoalveolar abnormalities
- To study the characteristic features of the prevalence of dentoalveolar anomalies in the population of Kizlyar
- To evaluate the degree of dentition anomalies in the population of the northern regions in the Republic of Dagestan
- To develop recommendations to reduce risk factors for dentoalveolar anomalies

Novelty of Research

The research updated data on the chemical composition of underground drinking water sources in the northern regions of the Republic of Dagestan; identified risk factors that underlying the problems with drinking water in the city of Kizlyar and other areas of the northern territories in the Republic of Dagestan, due to the imbalance of micro- and macroelement composition; identified the risks caused by the drinking water of poor quality on the prevalence of individual dentoalveolar anomalies and malformations among school-age children (7-17 years old).

The research revealed the incidence of caries in children consuming low-quality drinking water rich in arsenic and with low fluoride content in the city of Kizlyar in the Republic of Dagestan.

The Material and Methods of Research

The research materials were the population under the age of 60 in the northern regions of the republic. The studies were conducted in the city of Kizlyar and the Kizlyar district of the Republic of Dagestan. In the research areas for 2 years (2017, 2018) 100 people at the age of 6-16; 25-35 and 50-60 were examined in accordance with the population age pattern.

Within the study we conducted a survey of children with dentoalveolar anomalies aged 7-17 years with the aim to determine the health level of children and their mothers at the time of their birth.

The primary data collection was carried out based on questionnaires in which the following questions were to be answered:

- Present address, source of drinking water (well, artesian well, tap water), and food supply
- Age at the first visit to the doctor, to the dentist
- Whether a treatment was provided and for what disease.

Further examination was carried out using a standard set of tools: dental mirrors, explorers, and forceps in broad daylight. During the examination, the shape of the dental curve, the state of primary and permanent teeth, the state of dental tissues and buccal mucous membrane, the attachment of the frenum of the upper, lower lips and tongue were studied. The occlusal contacts in the anterior and posterior teeth were evaluated.

As a result of the examination, indicators for the prevalence of dentition anomalies (the percentage of the patients examined), caries, periodontal diseases, and the buccal mucous membrane were specified.

Applying the method of variation statistics, the intensity of caries damage of primary and permanent teeth was determined through the DMF/DMFT indices (per 1 person examined). The mean values (M) and the errors to them ($\pm t$) were calculated.

Facial signs of abnormalities and deformations, postural abnormality of a child, and chewing pattern were determined; the presence of bad habits was revealed, as well the state of the nasopharynx, patterns of swallowing, and breathing. Assessing the data of clinical samples with a piece of cotton wool it was determined the state of respiratory function. Swallowing function was detected through the swallowing test. Patient files were filled according to the standard examination scheme; biometric analysis,

examination data and signs of the disease were recorded. Based on the obtained data the diseases were diagnosed.

Chemical water studies were carried out in accordance with current regulatory and methodological documents and provisions of methodological documentation ensuring accurate analysis results: "Unified methods of data collection, analysis and estimation of the disease incidence, considering the integrated effects of environmental factors" and the integrated evaluation of the anthropogenic load on water bodies, soil, and atmospheric air in residential development areas" (NCDC RF, 1996).

Research Findings

Scientific literature found that the prevalence of dental caries in all regions of the republic is up to 100%, which was high relative to other regions. A low prevalence of caries is observed in the mountainous regions of the republic, due to more environmentally friendly living conditions and healthy food. The highest rate is registered in the northern regions, where industrial production and agriculture are advanced, contributing to risk factors for the diseases development.

Between 2017 and 2018 we conducted comprehensive environmental studies of air, water, and soil in the city of Kizlyar and district of the Republic. It is known that one of the factors in the occurrence of dentoalveolar anomalies is environmental pollution, namely air pollution. Air pollution also causes cancer of the throat and skin, lungs, allergy, and many other diseases. In the city of Kizlyar, water is supplied from artesian sources. The water samples taken from all sources revealed an increased concentration of several analyzed pollutants, including the salts of heavy metals. Excessive levels of cobalt and iron in drinking water were found at several pumping stations in the city, as well as high concentrations of aluminum, zinc, manganese, arsenic, formaldehyde, and phenol significantly exceeded the maximum admissible concentrations in several water samples in the city of Kizlyar [1].

The findings of the studies demonstrate that the zinc content exceeds the permissible standards 13.4 times in the experimental area No. 4, well No. 2. The maximum cobalt content is 3.1 times higher than the maximum admissible concentrations in area No. 2, well No. 2. The cobalt content in the water was 0.33 mg/l. In well No. 2 of experimental area No. 5, the formaldehyde content exceeds more than 3 times the maximum admissible concentrations. A maximum manganese concentration of 0.7 mg/l was found in water sampled at the central well. The arsenic content is 6 times higher than the maximum admissible concentration, in area No. 4, well No. 2. In the central well the excess of the permissible phenol concentration was 32 mg/ml.

Thus, the exceeding maximum admissible concentrations of aluminum, zinc, manganese, arsenic, phenol, and formaldehyde were found in drinking water in Kizlyar. The findings of the study of the ecological situation in the city of Kizlyar, the Republic of Dagestan, and the peculiarities of the geographical distribution over the republic territory show that the content exceeding the maximum admissible concentration of heavy metal salts in soil, water and air has a direct correlation with the incidence and prevalence of dentoalveolar anomalies and dental caries of the population [5,9]. Our further studies of the macro and microelement composition of groundwater indicated an imbalance in the content of various elements. There was an excess of iron content in water, which in certain wells reached 0.9 mg/l.

When it comes to fluorine content in water, there was observed a deficiency, which is ranged from 0.1 to 0.2 of the maximum admissible concentration and corresponds to 0.7-1.2 mg/l. The water in the central well of area No. 2 is characterized by increased arsenic concentrations, which reaches 0.16-0.22 mg/l, while a norm is 0.05 mg/l. The turbidity level was up to 1.9 mg/l. As for other indicators, including microbiological one, all tested water samples were in line with the norms (Table 1). The sample taken from the supply of water to the city of Kizlyar demonstrated the different chemical composition of water in various sources [1]. Water quality does not comply with the following requirements defined by the regulatory documents: organoleptic properties; turbidity and iron, water hardness (Table 2). The low fluorine content in water can cause dental caries as it was identified by many studies. Arsenic can accumulate in the body, reducing the immune system and, accordingly, increasing the propensity to dentoalveolar diseases (Table 1).

The analysis of indicators of drinking water chemistry (increased arsenic concentrations, fluoride deficiency) and the state of public health revealed correlation coefficients for some diseases (Table 2).

A correlation between the low fluorine content in drinking water and the incidence of caries has been established (Table 3).

Our studies have established an imbalance in the chemical composition of groundwater supplied to the Kizlyar water supply system, which causes the problems with drinking water for the population and the pollutants content exceeding the maximum admissible concentrations: arsenic up to 2, iron up to 3, fluoride deficiency up to 0.2, and low levels of water hardness up to 0.3. [10,11] More than 75 percent of the unfavorable environmental conditions are caused by the water factor, followed by the atmospheric factor (20%) and the soil factor (10%).

Table 1: Physico-chemical indicators for the water content in Kizlyar sources.

Experimental areas	Turbidity	Water hardness	Lead	Sulphate	Nitrate	Aluminum	Ammonia	Chloride	Fluorine	Copper	Arsenic	Zinc	Iron	Salinity
1	1.6	3.5	0.001	176	0.3	0.31	0.6	130	0.31	0.1	0.18	0.06	0.4	574
2	1.3	3.8	0.001	232	0.2	0.25	0.5	225	0.23	0.2	0.21	0.04	0.33	680
3	1.4	5.8	0.001	284	0.3	0.34	0.4	255	0.25	0.04	0.3	0.06	0.4	555
4	1.2	2.8	0.001	275	0.2	0.33	0.3	250	0.31	0.3	0.1	0.05	0.2	570
5	1.4	3.5	0.001	295	0.2	0.31	0.5	230	0.25	0.4	0.15	0.04	0.31	650
6	1.3	2.7	0.001	172	0.3	0.38	0.5	282	0.32	0.1	0.2	0.02	0.25	672
7	1.2	2.9	0	267	0.4	0.32	0.3	275	0.27	0.1	0.22	0.03	0.32	630

Table 2: Water chemistry in Kizlyar water-supply.

Indicators	Actual Composition (mg/l)	Maximum Admissible Concentration
Microbiological Indicators	15% of samples do not comply	
Arsenic	1.0-2.5	0.05
Fluorine	0.2-0.3	1.2
Iron	1.5-4.0	3.3
Water Hardness	0.26-0.35	0.33
Turbidity	0.1-2.0	1.7

Table 3: Correlation between the increased content of arsenic in drinking water and the incidence of diseases in Kizlyar.

Types of Diseases	14-Year-Old Children	16 -18-Year-Old Children	Adult Population
Neoplasms	0.81	0.8	0.91
Congenital Anomalies	0.778	0.755	0.59
Dentoalveolar Anomalies	0.832	0.654	0.453

The assessment of the water chemistry established the harmfulness of drinking water due to the increased arsenic content; more than 70% of the water samples did not meet the standards regarding its content. Drinking water did not comply with the organoleptic requirements and characterized by the high

content of iron and the water turbidity. Water inferiority due to fluoride deficiency and low hardness values led to tooth diseases and secondary pollution of water on microbiological indicators and reduces the safety of drinking water for people (Table 4).

Table 4: The fluorine content in drinking water and the incidence of dental caries in children in Kizlyar (%).

Indicators	Year of Research		
	2016	2017	2018
Fluorine is under 0.4 mg/l	53	55	58
Fluorine is under 0.3 mg/l	25	24	22
The incidence of caries in children under 14 years of age	67.5	73.2	71.3
Correlation coefficient	0.8		

To achieve the set goal, we were faced with the task of research: to study the characteristics of tooth decay in the children of different ages of Kizlyar, as well as to evaluate the anomalies of their dentitions. The index DMFT (t) used in assessing the intensity of dental caries was calculated as the sum of teeth affected by untreated caries and filled teeth and the index DMFT (s) as the sum of decayed and filled surfaces. To calculate the average value of the

indices DMFT (t) and DMFT (s) in the group of subjects, we first determined the index for each examined person and added up all the values. Next, the amount received was divided by the number of people in the group. The DMF Index(t) corresponds to the sum of all teeth, exactly the carious teeth removed and filled, while the DMFT(s) index is the sum of all surfaces of the diagnosed teeth.

We examined 100 people, including 50 girls and 50 boys, the results of the examination are presented in Table 5, from which we can conclude that in the groups of preschool children the

prevalence of dental caries was 82.0%. It was established that with the transition from the age of 3 to 7, the frequency of dental caries increases from 70.5% to 90.5% (Table 5).

Table 5: Dependence of the prevalence of dental caries in preschool children.

Age of Children	The Number of Examined Children	Incidence, %	Index	
			DMF	DMFT
2	50	60.5	-	2.8
3	50	76.3	-	4
4	50	82.3	0.01	4.5
5	50	86.5	0.08	4.7
6	50	89.3	0.08	4.9
Total	200	79.2	0.02	3.9

The findings of studies indicate that among Kizlyar preschoolers, the level of tooth decay is rather high, which may be dependent on the high prevalence of decay of temporary teeth, since at the age of five, the intensity of decay of permanent teeth was revealed in preschoolers. In all examined preschoolers, 4 temporary teeth were almost destroyed by caries. At the age of 2, the DMFT index reaches 2.8, increasing by 6 years and reaching 4.9 for affected temporary teeth. The data obtained demonstrated a high degree of tooth decay in preschool children and the need for dental care for children to have their temporary teeth attended. Our further examination of schoolchildren indicated that the prevalence of permanent teeth caries is like the data on the temporary teeth decay (Table

6). Among 250 schoolchildren examined 86.5% had their teeth affected by tooth decay. Studies on the intensity of caries lesion of the permanent teeth in the examined schoolchildren showed that there were teeth affected by caries in each age group; in this case the DMF index amounted to 2.2. It has been established that while children grow up, the DMF index slowly increases from 0.6 at the age of 7 to 4.3 at the age of 16. Over 10 years, the intensity of the lesion increases almost sevenfold [12,13]. The dynamics of an increase in the prevalence of caries of temporary teeth that we identified is completely correlated with the data obtained by other researchers in the manifestation of this pathology.

Table 6: Dependence of the prevalence of dental caries in preschool children in Kizlyar.

Age of Children	Number of Patients Examined	Incidence, %	Indices	
			DMF	DMFT
7	25	94.2	0.6	4.5
8	25	93	0.9	3.9
9	25	96.6	1.6	3.7
10	25	90.1	1.7	1.6
11	25	78.3	1.6	0.9
12	25	81	1.9	0.3
13	25	75.6	2.5	0.2
14	25	77.1	3.4	-
15	25	88.3	3.7	-
16	25	92.1	4.3	-
Total	250	86.6	2.2	1.5

The highest intensity of decay per temporary tooth per child for children of the age group of 7 was found in 94.2% of schoolchildren, while the DMF index was 4.5. By the age of 13, the DMF index reaches the minimum level amounting to 0.2. As temporary teeth are replaced by permanent ones, caries prevalence is naturally reduced, while the DMF index reaches 1.9. All the children under examination had on average 1.5 temporary teeth affected by caries.

These findings prove that there is a high level of tooth decay in schoolchildren of Kizlyar. The findings of our research in caries prevalence among schoolchildren in the Kizlyar are consistent with the previously made statements by various researchers who claimed that tooth decay in the southern regions is lower than in the central and northern regions.

According to various classifications, the level of caries prevalence among children in Kizlyar can be classified as a region with low intensity. Our data are confirmed by the WHO classification (Geneva, 1985). Based on the data acquired from our studies, we can indicate a high Kizlyar's children need for the caries treatment, although the findings show low percentage of pathology prevalence in the examined preschool and school children in Kizlyar. In connection with the transition to market relations and a reduction in budget financing of dental institutions in Kizlyar, serious problems arose in the dental care for the Kizlyar population. Children's dental clinics of Kizlyar are making serious efforts to improve the situation and are looking for ways out of this predicament. High temporary teeth caries prevalence and inadequate dental care in the city can lead

to an increase in the number of children with severe pathology, as anomalies of the dentition.

Our further research was devoted to the analysis of the dentition anomalies prevalence among children in Kizlyar.

According to many researchers, over recent years there has been an increase in the population suffering from anomalies of the dentition in almost all regions of the country. The problem under investigation is most topical since no one had previously conducted such an analysis and examination of the child population. Research founded that the prevalence of dentition anomalies among school and preschool children in Kizlyar reaches enormous values and on average among preschool children corresponds to an indicator of 55.3% (Table 7).

Table 7: The Percentage of dentition anomalies among preschool children in Kizlyar.

Age (years)	Prevalence, %		
	Teeth Abnormalities	Occlusion Abnormalities	Total
3	6.5	48.8	55.3
4	7.2	44.6	49.8
5	8.5	36.4	44.9
6	9.8	39.9	49.7
7	9.9	41.2	51.1

In various age groups of preschool children, the frequency of prevalence is different, but there is not a substantial difference. Thus, the prevalence of occlusion anomalies of all the dentition anomalies among children aged 3 years amount to 48.8%, which tended to decrease slowly with age, and corresponded to 36.4% at the age of 5 and 39.9%, at the age of 6, which indicates the severity of the detected pathology claiming attention. The prevalence of malocclusion by the age of 7 remained at the level of 41.2%, which confirms the fact of a slow decrease in pathology with the age of the patients under examination. The prevalence of anomalies of

individual teeth among preschool children averaged 9.9% by the age of 7 without a significant difference in ages, since by the age of 3 the figure corresponded to 6.5%. Among preschool children of all age groups examined, a high incidence of dentition anomalies was noted. Compared with tooth abnormalities, the frequency of occlusion anomalies is 6 times greater, and lesions increase from 36.4% to 48.8%, respectively. At the age of 3, the percentage of abnormalities is 48.8%, and by the age of 4 it decreases to 44.6%.

Relevant results were obtained when analyzing the prevalence of dentoalveolar anomalies among schoolchildren (Table 8).

Table 8: Dependence of dentition anomalies incidence on the age of schoolchildren (Kizlyar).

Age of Children (years)	Anomalies Prevalence (%) of		
	Occlusion	Teeth	TOTAL
7	50	20	70
8	41.7	18.3	60
9	35.4	11.7	47.1
10	30.6	20.7	51.1
11	32.6	16.3	48.9
12	37.4	14.5	51.9
13	39.8	21.6	61.4
14	34	14.4	48.4
15	36.9	18.5	55.4
16	30.1	19.2	49.3

A comparative analysis of the prevalence dentition anomalies among of the schoolchildren revealed that the percentage of prevalence among schoolchildren is significantly higher than among preschool children. More than 50.0% of the examined schoolchildren aged 7 had malocclusion. By the age of 16, there is a slow decline in this indicator, which corresponds to 30.1%. The prevalence of tooth abnormalities at the age of 7 is 20.0% that is 2.5 times higher than malocclusion. By the age of 16 the prevalence of tooth abnormalities, do not change significantly and corresponds to an indicator of 19.2%.

We established that dentition anomalies are age-related, and they are associated with the replacement of temporary teeth by permanent ones and the process of shaping teeth occlusion that occurs at this age. In the groups of 7-, 8-, and 13-year-old schoolchildren there were registered high rates of anomalies, the increase dynamics of which ranged from 60.0% to 70.0%. We confirmed the findings of other researchers that temporary malocclusion plays a significant role in the development and prevalence of dentition anomalies. Relevant observations were noted by our team among the examined groups of the children in Kizlyar, which indicates the need for organizing children's dental care in this city. The available number of dentists in municipal dental clinics in the whole Republic, most of which work in Makhachkala, is certainly not enough, given the amount of pathology identified to provide the necessary dental care for children, which indicates the need for an urgent solution to the problem of dental care for children in the city [14-16]. Our further studies were devoted to identifying the factor in the distribution of children dentition anomalies in Kizlyar, considered the fact that in the literature there are studies conducted by many scientists confirming the dependence of the dental caries incidence among children on the frequency of the dentition anomalies.

We carried out a comparative analysis of the dependence of the dentition anomalies prevalence on the caries development and its prevalence. We examined 500 children of school and preschool age both affected by caries and not. Of the total number of preschoolers examined in Kizlyar, 101 were not affected by caries and 399 were affected, which is 75.9%.

Of the 500 school students examined, only 70 people did not have carious lesion, which corresponds to 14.0%. 86.0% of the children examined suffered from dental caries, which amounted to 430 people. A total of 171 children of preschool and school age without tooth decay were identified, caries was diagnosed in 829 examined patients. The obtained data on the prevalence of dentition anomalies among schoolchildren and preschool children of different groups in Kizlyar are presented in Table 9.

Our studies did not confirm a relationship between the prevalence of dentoalveolar system abnormalities and tooth decay in children of school and preschool age. Further studies on the reduction or increase in the incidence of dentition anomalies with age demonstrated that with the growth of children there was a tendency to increase in incidence in people without caries. Our findings suggest that there is no significant relationship between tooth decay and the prevalence of dentition anomalies among children (Table 9).

Table 9: Analysis of the dentition anomalies prevalence in children of preschool and school age, Kizlyar %.

Examined Children	Dentition Anomalies Prevalence, %	
	Without Caries	With Caries
Preschool Children	34.5	78.2
School Children	24	85.4
On Average	29.3	82.8

It is more likely that dentition anomalies can be associated with a genetic disposition and these processes are independent of each other. The results of the studies found that the prevalence of dentition anomalies in children whose teeth affected and not affected by caries correspond to 55.2% and 57.3%, respectively, which indicates an insignificant difference (Table 10).

Table 10: Dependence of the prevalence of dentition anomalies and caries in children of preschool and school age, Kizlyar %.

Examined Children, Age (years)	Dentition Anomalies Prevalence, %	
	Without Caries	With Caries
Preschool Children, (2-6)	55.2	57.3
School Children, (7-15)	45.6	48.9
Average Figures	50.4	53.1

Similar results were observed in school-age children, 45.6% and 48.9%, the prevalence of anomalies in children without caries and with caries, respectively. Untimely treatment and removal of temporary teeth can lead to an increase in the prevalence of dentition anomalies, which can cause defects and dentition deformation. A part of our research has been devoted to the study of the effect of periodontal disease on the development of dentition anomalies.

Diseases of periodontal and mucous tunic of the mouth occupy a significant place in the structure of dental disease incidence. The opportunity to reduce dental diseases prevalence in the adult population is higher in case of identifying these lesions in children of preschool and school age.

The examination of the preschool-age children revealed 2 forms of periodontal disease in the incidence structure of the

mucous tunic of the mouth, namely, inflammation of the lips with affecting both the mucous membrane and the red border (cheilitis) and inflammatory-dystrophic lesion of the mucous membrane of the tongue (desquamative glossitis). Cheilitis, lip lesions, are most common in all age groups, and the percentage of prevalence corresponds to 21.5% - 43.7% among the patients examined. While

children are growing the prevalence of this anomaly increases. So, by the age of 3 years, the prevalence of cheilitis among preschool children corresponds to 21.5%, and by the age of 7, the prevalence increases by more than 2 times and corresponds to 43.7% (Table 11).

Table 11: Development and prevalence of diseases of the mucous tunic of the mouth among preschool children %.

Age of Patients	Prevalence, %		
	Cheilitis	Desquamative Glossitis	Total
3	21.5	6.9	28.4
4	25.6	3.8	29.4
5	35.4	3.1	38.5
6	42.3	3.2	45.5
7	43.7	3.5	47.2

In all age groups, the occurrence of desquamative glossitis in all patients examined ranged from 6.9% to 3.5%.

While patients under examination growing, we register a decrease in this pathology. So, if at the age of 3 the prevalence of desquamative glossitis among preschool children was 6.9%, then by the school age of 7 it decreased almost twofold and amounted to 3.5%. These pathologies are temporary in nature and mainly depend on the climatic conditions of the region, the sudden changes in temperature and strong winds. In addition to the above-mentioned factors, the appearance of cheilitis is also caused by frequent licking of the lips. The main prophylaxis of their manifestation is the elementary adherence to normal hygiene standards.

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