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V.V. Horokhovskiy, O.V. Dienha<sup>1</sup>, A.E. Dienga<sup>1</sup>, T.O. Pyndus<sup>2</sup>, A. Jenča Jr.<sup>2</sup>,  
S.A. Shnaider<sup>1</sup>, I.O. Tsushko<sup>1</sup>

Odessa National Medical University, Odessa,

<sup>1</sup>State Establishment "The Institute of stomatology and maxilla-facial surgery National academy of medical sciences of Ukraine", Odessa,

<sup>2</sup>Pavol Jozef Safarik University and Academy of Kosice, Košice, Slovakia

## ANALYSIS OF THE FREQUENCY AND STRUCTURE OF NON-CARIOUS LESIONS OF HARD TISSUES OF TEETH IN CHILDREN

e-mail: oksanadenga@gmail.com

The study is devoted to determining the prevalence and structure of non-carious lesions of the hard tissues of the teeth in children 6–15 years of Odessa. The study involved 720 children aged 6 to 15 years. They were divided into 3 age groups. The dental examination was performed in a dental office. As a result of the conducted researches the high prevalence of non-carious lesions of the hard tissues of the teeth in children of the city of Odessa was established. It is concluded that children with non-carious lesions of the hard tissues of the teeth need dispensary supervision at the dentist and timely treatment. It is necessary to develop new modern methods to prevent the development and prevention of complications of non-carious lesions of the hard tissues of the teeth in children.

**Key words:** children, oral health, teeth eruption, dental care, hard tissues of teeth.

V.V. Гороховський, О.В. Дєньга, А.Е. Дєньга, Т.О. Пиндус, А. Єнча,  
С.А. Шнайдер, І.О. Цушко

## АНАЛІЗ ЧАСТОТИ ТА СТРУКТУРИ НЕКАРІОЗНИХ УРАЖЕНЬ ТВЕРДИХ ТКАНИН ЗУБІВ У ДІТЕЙ

Дослідження присвячено визначенню поширеності та структури некаріозних уражень твердих тканин зубів у дітей 6–15 років міста Одеса. В дослідженнях приймали участь 720 дітей віком від 6 до 15 років. Вони були розподілені на 3 вікові групи. Стоматологічний огляд було проведено в умовах стоматологічного кабінету. В результаті проведених досліджень було встановлено високу поширеність некаріозних уражень твердих тканин зубів у дітей міста Одеси. Зроблено висновок, що діти з некаріозними ураженнями твердих тканин зубів потребують диспансерного нагляду у стоматолога та своєчасного проведення лікувальних заходів. Необхідна розробка нових сучасних методів запобігання розвитку та профілактики ускладнень некаріозних уражень твердих тканин зубів у дітей.

**Ключові слова:** діти, стан порожнини рота, прорізування зубів, стоматологічна допомога, тверді тканини зубів.

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Modern epidemiological studies of the oral cavity in children and adolescents indicate a high level of dental morbidity in this age group of Ukraine. Unfortunately, so far the prevalence of major dental diseases is much higher than in other European countries [2, 7, 11]. High prevalence and intensity of caries of permanent teeth in children indicate the need for more thorough diagnosis of all risk factors for its occurrence. Given that the main complication of non-carious lesions is dental caries, the study of hard tissues of teeth of non-carious origin in children is an urgent task of modern medicine [13].

Ameloblasts are known to be secretory cells that are involved in the formation of tooth enamel and are very sensitive to endogenous and exogenous factors [1, 5, 14]. Since enamel is formed only during a certain period of tooth development, the dysfunction of these cells at the stage of emaleogenesis can lead to permanent irreversible morphological defects of its development. Such defects can manifest themselves in the form of structural disorders or lack of enamel in a certain area. These areas can be additional retention points for microorganisms, food debris and soft dental plaque, which can be factors that can cause tooth

decay [9]. At the same time, the complaints of patients with existing non-carious lesions who go to the doctor are diverse – the presence of an aesthetic defect, pain, rapid tooth decay, halitosis and others [8].

The process of maturation of the enamel of permanent teeth after their eruption is well known to dentists, both in clinical terms and as a scientific problem. The results of numerous scientific studies indicate that the enamel of permanent teeth erupting in children is not completely mineralized and the process of its “maturation” continues in the oral cavity for a long time due to washing teeth with saliva. The study of dental status showed that in recent decades, reversibility for hyperesthesia of hard tissues of teeth in Western Europe has increased by 35 %, in the USA – by 42 % [12].

The pathogenesis of this disease is associated with an increase in the permeability of enamel and the perception of pain by the receptor apparatus of the tooth with intact hard tissues.

The most common disease of hard tissues of teeth of non-carious origin, which are formed before their eruption, is enamel hypoplasia. The hypoplasia of the teeth speaks for the fact of the early appearance of a carious process in recently erupted teeth, which is known to pediatric dentists. The carious process can occur in the molar even in the process of eruption of the chewing surface of the crowns of the teeth. An important condition for the formation of caries-resistant enamel is now considered to be the physiological course of its maturation. The final maturation of the enamel takes place after the eruption of teeth, most intensely during the first year of the crown of the tooth in the oral cavity [4].

Summarizing the above, the study of the prevalence of non-carious diseases in children is an urgent task, the solution of which will ensure the creation of a data bank that will improve the provision of dental care to children and the implementation of a comprehensive program for prevention of major dental diseases.

**The purpose** of the study was to determine the prevalence and structure of non-carious lesions of the hard tissues of the teeth in children 6–15 years of Odesa.

**Materials and methods.** 720 children aged 6 to 15 were surveyed. They were divided into 3 age groups. The first group included 240 children (including 116 boys and 124 girls) 6–7 years of age. The second group included 240 children (including 122 boys and 118 girls) aged 11–12 years and the third group included 240 children (including 120 boys and 120 girls) aged 14–15 years. Dental examination was performed in the dental office at the clinical base of the department of pediatric dentistry of Odesa national medical university (Department of pediatric dental health of the multidisciplinary medical center of ONMedU) and the Department of Epidemiology and Prevention of Major Dental Diseases, Pediatric Dentistry and Orthodontics of the SE “The Institute of Stomatology and Maxilla-Facial Surgery National Academy of Medical Sciences of Ukraine” (SE “ISMFS NAMS”). Differential diagnosis of fluorosis, hypoplasia and the initial form of dental caries was performed using vital staining of teeth with a solution of methylene blue [3, 6]. Survey data were recorded in children's dental examination cards according to the recommendations of the World Health Organization. For all children, the place of birth, the place of their actual residence and the place of residence of the mother during pregnancy were determined to define the biogeochemical features of the area, the presence of macro- and microelementoses. The food preferences of the children were also determined. [7].

The results were processed by variational statistical methods of analysis using the Microsoft Office Excel 2016 software. Statistical processing of the experimental study results was carried out by the methods of variation analysis using the Student's test. The difference was considered statistically significant at  $p < 0.01$ .

**Results of the study and their discussion.** Table 1 shows the analysis of the results of the dental examination in children of different ages, which indicates a high prevalence of non-carious lesions that develop before teeth eruption.

Table 1

**Prevalence of non-carious lesions of teeth that occurred before teeth eruption in children of Odesa**

Groups		Non-carious lesions		Enamel hypoplasia	Fluorosis
Age group	6–7 years, n=240	Male, n=116	Abs.	15	4
			%	12.93	3.45
		Female, n=124	Abs.	17	2
			%	13.71	1.61
	11–12 years, n=240	Male, n=122	Abs.	26	2
			%	21.31	1.64
		Female, n=118	Abs.	30	3
			%	25.42	2.54
14–15 years, n=240	Male, n=120	Abs.	29	1	
		%	24.16	0.83	
	Female, n=120	Abs.	31	1	
		%	25.83	0.83	

The main non-carious lesions were enamel hypoplasia and fluorosis. The highest incidence of enamel hypoplasia was in children of the third age group (14–15 years) and amounted to 25 % (60 children), and the lowest in the first age group (6–7 years) and amounted to 13.33 % (32 children). Thus, in girls aged 6–7 years (17 people), enamel hypoplasia was more common than in boys by 0.78 % (15 people). It should be noted that this trend was also observed in other age groups of children. In the second age group (11–12 years) the incidence of hypoplasia in boys (24.16 %). was lower than in girls (25.83 %) by 1.67 %. Enamel hypoplasia was found in 23.33 % of surveyed children aged 11–12 years. It should be noted that hypoplasia was diagnosed more often in girls than in boys in this age group. Thus, enamel hypoplasia (25.42 %) was found in 30 examined girls aged 11–12, which is by 1.19 times more than in boys of the same age (21.31 %).

Systemic hypoplasia was found in 7.5 % of children of the first age group, in 7.08 % of children of the second age group and in 6.67 % of children of the third age group. Local hypoplasia was more common on permanent incisors and premolars. The spotted form of hypoplasia was more common (in 87.64 % of cases) in the form of an opaque white color, less often light yellow and brown. Point and furrow form of hypoplasia accounted for 12.36 % of all forms of dental hypoplasia. It was found that the main complication of enamel hypoplasia in children was dental caries. Therefore, during the implementation of dental caries prevention programs, great attention should be paid to children with impaired mineralization processes that occurred before teeth eruption.

Fluorosis in children of the city of Odesa was much less common than dental hypoplasia and was found in 2.5 % of children in the first age group, in 2.08 % of children in the second age group and in 0.83 % of children in the third age group. It should be noted that in the first age group (6–7 years) the incidence of fluorosis in boys exceeded the value of girls in this group by 2.14 times. At the same time, in children of the second age group (11–12 years) the frequency of this parameter was the highest in girls and exceeded the value of boys by 1.54 times. In the third age group, the value of the incidence of fluorosis was the same in both boys and girls and was equal to 0.83 %. An analysis of the anamnesis of the life of these children indicates that they were born in the Bolgradsky, Artsyzsky and Ivanovsky districts of the Odesa region. No case of fluorosis was found in children born and permanently residing in the city of Odesa, which, in our opinion, was due to the low content of fluorine in the water in the city (0.3 mg/l). Thus, it should be noted that when prescribing drugs that contain fluoride compounds to prevent dental caries in children of different ages should take into account the place of birth.

Table 2 presents data that indicates that the most common non-carious disease of hard tissues that occurred after teeth eruption in children of different ages was hyperesthesia of the teeth.

Table 2

**Prevalence of dental hyperesthesia that occurred before teeth eruption in children of Odesa**

Groups		Non-carious lesions		Hyperesthesia of the teeth	
Age group	6–7 years, n=240	Male, n=116	Abs.	12	
			%	10.34	
		Female, n=124	Abs.	11	
			%	8.87	
	11–12 years, n=240	Male, n=122	Abs.	19	
			%	15.57	
		Female, n=118	Abs.	36	
			%	30.5	
	14–15 years, n=240	Male, n=120	Abs.	65	
			%	54.2	
		Female, n=120	Abs.	52	
			%	43.3	

It was found that the main mechanism of hyperesthesia was the demineralization of hard tissues of the teeth due to eating disorders and increased consumption of sweet drinks containing acids. The highest prevalence of hyperesthesia was found in children aged 14–15 years (48.75 %), and the lowest in children 6–7 years (9.58 %). At the same time, the frequency of dental hyperesthesia in boys aged 14–15 was 54.2 %, which was 10.9 % higher than in girls (43.3 %). In the age group of 11–12 years, hypersensitivity was 1.95 times more common in girls (30.5 %) than in boys (15.57 %), due to changes in physiological processes in the oral cavity during puberty. In the first age group (6–7 years) the incidence of hyperesthesia in boys was 10.34 %, which is 1.16 times higher than in girls in this age group (8.87 %).

Analysis of modern literature shows that the prevalence of non-carious lesions is increasing [1, 13]. Among non-carious lesions that develop after teeth eruption, the most common is hyperesthesia of the teeth. Hyperesthesia of the teeth (increased sensitivity of tooth tissues to mechanical, chemical,

temperature stimuli) accompanies many dental diseases: inflammatory and destructive periodontal diseases, caries and a number of non-carious lesions of the teeth, such as enamel hypoplasia, wedge-shaped defect, tooth erosion [12]. According to the world literature, up to 57 % of the world's population suffers from dentin hypersensitivity. The study of the prevalence of hypersensitivity in terms of age emphasizes a significant increase in morbidity in the young population – up to 78.8 % [15]. Recently, some authors [3] note the appearance of hyperesthesia in children and adolescents, which is associated with pathology or trauma to the hard tissues of the teeth. Hypersensitivity may occur in children. Weak mineralization of the hard tissues of the teeth immediately after teeth eruption leads to the rapid development of hypersensitivity [9, 12]. Given that the main complication of non-carious lesions is dental caries, the study of hard tissues of teeth of non-carious origin in children is an urgent task of modern medicine. As a result of this work, the presence of high prevalence of non-carious lesions of the hard tissues of the teeth in 6–15 years old children of Odesa was established. It should also be noted that children with non-carious lesions of hard tissues of the teeth need dispensary observation at the dentist and timely therapeutic measures. The obtained results, in our opinion, should be taken into account for the development of a treatment and prophylactic scheme and new modern methods for preventing the development of complications of non-carious lesions of hard tissues of teeth for 6–15 years old children. In the future, this can help in aiding children with such pathology.

### Conclusions

1. As a result of the study, a high prevalence of non-carious lesions of hard tissues of teeth in children from Odesa was established.
2. Children with non-carious lesions of hard tissues of the teeth require dispensary observation at the dentist and timely remedial measures.
3. It is necessary to develop new modern methods for preventing the development and prevention of complications of non-carious lesions of hard tissues of the teeth in children.

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