
CHARACTERISTICS OF CARIOUS LESIONS OF PERMANENT TEETH IN 12-YEAR-OLD CHILDREN

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<https://doi.org/10.35339/ic.11.1.gok>

ABSTRACT

Background. The article deals with the characteristics of the condition of hard tissues of permanent teeth in children depending on the region of residence.

Aim. To characterize the condition of the hard tissues of the teeth in 12-year-old children living in different districts of Bukovyna.

Materials & Methods. 298 12-year-old children were examined in 13 schools in Chernivtsi region (78 children from Vyzhnytsky district, 74 from Chernivtsi, 146 from Dnistrovsky). The prevalence, intensity of caries, the index of the international caries detection and evaluation system were determined.

Results & Conclusions. The incidence of caries in 12-year-old children was high in all regions: 88.46% in Vyzhnytsia, 84.50% in Dniestr and 84.89% in Chernivtsi districts. The highest caries intensity values were found in children of the Vyzhnytsia District (3.39 ± 0.21) affected teeth, the lowest – in the examined children of the Dniester District – (2.88 ± 0.28). In the structure of the "DMF" index (Decay-Missing-Filled), the "D" component prevailed in all regions. It is worth noting that the extracted teeth were from 0.34% to 1.76%. In all regions, the average level of intensity prevailed, but the share of children with a high level was also high, from 24.32% to 38.46%. The carious process is characterized not only by simultaneous carious lesions of different groups of teeth, but even several surfaces of one tooth. Half of all carious cavities (52.88%) were diagnosed on the chewing surface of the lateral teeth, 24.00% – on the contact surfaces of all groups of teeth, 14.49% – on the vestibular surface of the incisors, and 7.02% – on the oral surface of the lateral teeth incisors. As for the depth of the lesion, 53.56% of carious cavities were located on the enamel surface, 26.95% – in the thickness of the enamel, 19.47% part – within the medium-deep layers of dentin. The high prevalence of caries in children of Bukovyna region indicates the need to study the regional risk factors for the development of caries.

Keywords: *children, caries, prevalence, intensity, localization of caries, depth of damage.*

INTRODUCTION

Caries is the most common dental disease in children and adults [1]. In Ukraine, the incidence is high, but the indicators vary depending on the region [2–6]. After all, development of caries is influenced by various factors, including climatic and geographical conditions. We conducted epidemiological studies in 13 schools of different districts of Chernivtsi region. This nosology is diagnosed in 84.89% of 12-year-old children. We

noted that the frequency of carious lesions in children changed not only with age, but also depending on the location. The need to develop and carry out regionally adapted preventive measures in order to increase the resistance of enamel leads to the need to study the characteristics of the state of the hard tissues of teeth in children of different age groups, compare the dynamics and determine the factors that contribute to the development of caries.

The aim of the study was to characterize the condition of the hard tissues of the teeth in 12-year-old children living in different districts of Bukovyna.

Materials and Methods

To achieve the goal of the study, we examined 298 children aged 12 in 13 schools in the Bukovyna region. The following groups were selected:

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1 – 78 children in Vyzhnytsia, 2 – 74 children in Chernivtsi, and 3 – 146 children in Dnister districts. The prevalence, intensity of caries of temporary teeth, level of intensity, index of the International Caries Detection and Assessment System – The International Caries Detection and Assessment System (ICDAS1-6) in different regions of Bukovyna were analyzed. The prevalence of caries was estimated by the number of children affected by caries, as a percentage of the total number of examined. The interpretation of the results was carried out according to the WHO nomenclature, where the value from 0% to 30% is considered as low prevalence, from 31% to 80% – medium, from 81% to 100% – high prevalence of dental caries. The intensity of caries of permanent teeth was assessed in each child according to the "DMF" index, where "D" is a tooth affected by caries, "F" is a sealed tooth, and "M" is a tooth removed due to caries complications. For this age group, WHO (WHO EURO, 1999) recommends evaluating the level of "DMF" according to the following criteria: (0–0.50) – very low; (0.51–1.50) – low; (1.51–3.00) – average; (3.01–6.50) is high and (6.51–10.00) is very high. Dental caries was assessed according to the International Caries Definition and Assessment System – ICDAS. The ICDAS II (1–6) criteria were used to compare caries incidence rates [4; 7].

The degree of probability of the obtained results was statistically evaluated in the case of normality of the distribution of both samples using the Student-Fisher test, in other cases – the U-Wilkson test for independent samples and the T-Wilkson test for dependent samples.

Results and Discussion

The largest number of caries lesions of permanent teeth (88.46%) is in Vyzhnytsia district, the least (84.50%) – in Dnister (Fig.).

We noted an increase in the values of the structural elements of the intensity index in children with age, namely the "D" component in 12-year-olds increased to (1.96 ± 0.39) and the "F" component to (1.05 ± 0.37) (Table 1). The ratio between these indicators remains the same as in the previous age period – the predominance of the number of carious teeth over filled ones. However, their share varies depending on the region: 53.98% of carious teeth and 44.24% filled teeth in Vyzhnytsia district, respectively 74.31% and 25.35% in Dnister and 66.55% and 32.06% in Chernivtsi districts.

As for component "D", on average, in children of this age, its value is (1.93 ± 0.30) of cariously affected teeth. Among them, the largest number (3.00 ± 0.46) , $p < 0.05$ – in boys from the Dnistrovsky district, the smallest (1.30 ± 0.30) – in girls from the same region. The number of fillings was the highest among residents of Vyzhnytsia district (1.72 ± 0.32) , particularly among boys from this region; the lowest (0.54 ± 0.16) among boys of the Dnistrovsky district.

A demonstrative indicator of the quality of dental care for children is component "M" in the DMF formula. As you know, according to the WHO recommendations, children and adolescents under the age of 18 should not have their permanent teeth removed. In our study, the average number of extracted teeth in examined 12-year-old children was 0.03 ± 0.03 . The most of them are in the residents of Vyzhnytsky district (0.06 ± 0.02) , $p < 0.05$, the smallest (0.01 ± 0.01) , $p < 0.05$ – in Dniestr. In the share of the DMF index, extracted teeth in Vyzhnytsia district accounted for 1.76%, in Dnister – 0.34%, and in Chernivtsi – 1.03%.

In Chernivtsi and Dnister districts, the level of caries intensity is average, and in Vyzhnytsia it is high. The structure of caries incidence indicates

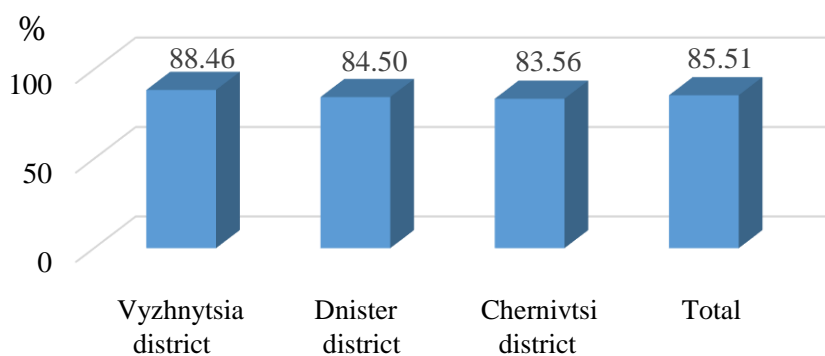


Fig. Prevalence of caries of permanent teeth in children aged 12, depending on the area of residence

Table 1. The structure of caries intensity of permanent teeth in 12-year-old children

District / indicator		DMF	D	M	F
Vyzhnytsia	boys (n=29)	3.75±0.41	1.93±0.30	1.72±0.32	0.10±0.05
	girls (n=49)	2.93±0.23	1.77±0.24	1.36±0.20	0.04±0.02
	total (n=78)	3.39±0.21	1.83±0.19	1.50±0.17	0.06±0.02
Dnister	boys (n=38)	3.57±0.48	3.00±0.46***	0.54±0.16	0.02±0.02***
	girls (n=36)	2.22±0.28**	1.30±0.30	0.91±0.17	–
	total (n=74)	2.88±0.28*	2.14±0.29	0.73±0.12	0.01±0.01*
Chernivtsi	boys (n=60)	2.50±0.28***	1.56±0.25	0.88±0.17	0.05±0.03
	girls (n=86)	3.18±0.23	2.18±0.20	0.97±0.14	0.02±0.01
	total (n=146)	2.90±0.18	1.93±0.15	0.93±0.11	0.03±0.01

Notes. *** – the difference between the boys' indicators is significant ($p<0.05$); ** – the difference between the indicators of girls, probable ($p<0.05$); * – the difference between the total indicators of girls and boys is significant ($p<0.05$).

that the share of children with a low level of intensity is the lowest and ranges from 10.25% in Vyzhnytsia district to 19.86% in Chernivtsi. The average level was characterized by a slight difference between the indicators in the regions from 39.04% to 40.54%. The largest number of children with a high level of intensity was observed in Vyzhnytsia district (38.46%), in other regions it is less: 24.32% in Dnister and 26.02% in Chernivtsi. 72.73% of all cavities are located on the first molars. Then on second molars (7.72% of cases), second premolars (5.62%), central incisors (5.51%), first premolars (4.21%) and lateral incisors (3.86%). The rarest carious lesions were diagnosed on canines (0.35%).

Caries on the lower jaw was diagnosed more often (in 55.38% of cases) (Table 2). The structure of the affected teeth was dominated by the first molars: lower – in 43.32% of children and upper – in 29.15%. Caries of hard tissues was detected in upper first premolars and lower second molars with the same frequency (16.39% each).

Regarding the rest of the teeth: lateral incisors, lower premolars, upper and lower second molars, even canines were cariously affected and their share was low, less than 5%. In the presence of chronic foci of carious infection of teeth, newly erupted premolars, second molars are subject to

faster damage due to weakly mineralized and immature enamel.

For children of this age, as well as for 6-year-olds, a combined lesion of several groups of teeth is characteristic. The general trends in the structure of damaged teeth were preserved depending on the region of residence.

Half of all carious cavities (52.88%) were diagnosed on the chewing surface of molars and premolars, a quarter – on the contact surfaces of all groups of teeth: 16.08% – on the medial and 9.51% – on the distal. Further, lesions were detected in 14.49% of cases on the vestibular surface, mostly incisors, and in 7.02% – on the oral surface of lateral incisors (blind pits were affected). It is worth noting that in children of this age we observed damage to two or three surfaces within one tooth. Such cases were less than 10% and were observed mainly in the inhabitants of the mountainous region.

In general, trends in the location of cavities were maintained, and differences were still found in different regions of the region. In particular, in the Vyzhnytsia district, 65.39% of cavities were located on chewing surfaces, a fifth – on contact surfaces, the rest less than 10% each: vestibular (8.35%) and oral (4.94%). In the Dniester region, a third (34.07%) is fissural caries, almost the same

Table 2. Structure of the location of carious cavities on different surfaces of permanent teeth in 12-year-old children

Surfaces	Vyzhnytsia district (n=78)		Dnister district (n=74)		Chernivtsi district (n=146)		Total	
	abs.	%	abs.	%	abs.	%	abs.	%
medial	27	10.26	34	18.99	81	18.36	142	16.08
distal	29	11.02	26	14.52	29	6.57	84	9.51
vestibular	22	8.36	44	24.58	62	14.05	128	14.49
oral	13	4.94	14	7.82	35	7.93	62	7.02
occlusal	172	65.39	61	34.07	234	53.06	467	52.88

share is caries of contact surfaces (33.51%), a quarter (24.58%) is the vestibular surface, and less than 10% is the oral surface. In children of the Chernivtsi region, the location of the cavities corresponded to the average values of this age period.

We obtained slight differences in the localization of cavities between regions, but we associate such results with the rapid damage of immature enamel in newly erupted teeth and the lack of timely treatment and prevention measures.

In 12-year-old children, 53.56% of carious cavities in permanent teeth were located on the enamel surface (code 1–2), 26.95% – in the thickness of the enamel (code 3), 19.47% – within the mantle layer (code 4–5) and pulpal dentin (code 6) (Table 3).

of the examined, the medium-deep layers of dentin were affected (codes 4–6).

For children of Chernivtsi district, the results are the same as in the previous region and correspond to the average values.

Conclusions

Therefore, the analysis of the results of the examination of children made it possible to reveal a high level of prevalence and intensity of dental caries according to the WHO criteria and an insufficient level of providing dental care to children under 12 years of age. The obtained data indicate that children of this age need timely and high-quality treatment and preventive measures, and actually measures with a predominance of prevention should be carried out for children of the pre-

Table 3. Analysis of carious lesions of temporary teeth in 12-year-old children according to the ICDAS II 1–6 index

Code	Vyzhnytsia district (n=78)		Dnister district (n=74)		Chernivtsi district (n=146)		Total	
	abs.	%	abs.	%	abs.	%	abs.	%
1–2	119	45.24	116	64.80	238	53.96	473	53.56
3	69	26.23	32	17.87	137	31.06	238	26.95
4–5	37	14.06	17	9.49	24	5.44	78	8.83
6	38	14.44	14	7.82	42	9.52	94	10.64

45.24% of children living in the Vyzhnytsia district were diagnosed with initial caries (code 1–2), 26.23% with superficial caries (code 3), and 14.06% with medium caries (4–5). In 14.44%, a deep dentin lesion was detected (code 6).

As for the Dnister district, two thirds of children have enamel damage (codes 1–3): in 64.80% – the stage of the stain and in 17.87% – a defect in the thickness of the enamel. And only in 14.96%

of the examined, the medium-deep layers of dentin were affected (codes 4–6).

DECLARATIONS:

Disclosure Statement

The author has no potential conflicts of interest to disclosure, including specific financial interests, relationships, and/or affiliations relevant to the subject matter or materials included.

Statement of Ethics

The author has no ethical conflicts to disclose.

Data Transparency

The data can be requested from the author.

Funding Sources

There are no external sources of funding.

Received: 17 Jan 2024

Accepted: 31 Mar 2024

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Cite in Vancouver style as: Godovanets OI, Kotelban AV. Characteristics of carious lesions of permanent teeth in 12-year-old children. *Inter Collegas*. 2024;11(1):33-7. <https://doi.org/10.35339/ic.11.1.gok>

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