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DENTAL HEALTH STATE OF CHILDREN LIVING IN DIFFERENT ANTHROPOGENIC CONDITIONS

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Abstract

The purpose of the work is to study dental health of children living in conditions of combined negative impact of natural and technological factors. **Materials and methods.** It was performed an epidemiological dental examination of 2,551 children aged 6 to 15 years, who settled in different regions of the Precarpathians, in conditions of iodine and fluoride deficiency (plain - 1087 children, foothills - 730 and mountain - 734 children). **Results.** Comprehensive epidemiological studies found low levels of dental health of children living in different geochemical and anthropogenic conditions of Ivano-Frankivsk region (48,83 ± 0,36)% in the general observation, that is not statistically different by regions examination, moreover girls level is lower, than that of boys in examined regions (48,14 ± 0,50) and (49,51 ± 0,52)%, respectively. It was founded, that the main diseases, which contribute to the reduction of dental health in children, is dental caries and its complications and abnormalities of dentoalveolar system. It was found, that the frequency and severity of dentoalveolar abnormalities depend on anthropogenic environmental conditions: in children of plain and foothill regions, that suffer from greater anthropogenic pressure, dentoalveolar abnormalities where found in (67,99 ± 1,42) and (65,21 ± 1,76)%, against (45,91 ± 1,84)% in children of conditionally pure mountain region. These same children also often recorded more severe pathology – combined anomalies (24,09 ± 1,57) and (22,06 ± 1,90)%, against (12,17 ± 1,78)%, respectively). It was found the connection between the dentoalveolar abnormalities and the presence of caries (r = + 0,95; p <0,01) and periodontal tissue diseases (r = + 0,79; p <0,05).

Keywords: children, dental health, dentoalveolar abnormalities, dental caries, periodontal disease, hypoplasia.

Introduction. European policy strategy "Health - 2020" among the priority areas of action involves the prevention of diseases, including early detection of health disorders, reducing the impact of risk factors. Health is seen as a national resource and integral value, which is determined by a set of unmanaged and managed environmental factors and internal environment [1, 2, 4, 11, 12]. Dental health is a complex concept, built into the general concept of health. It is defined as a combination of aesthetic, clinical, morphological and functional criteria of the dentoalveolar system, providing psychological, emotional, social and physical well-being of the person [6, 8]. Consequently, it is part of a general physical health and the relevant environmental impact indicators to be monitored. Particularly sensitive about the impact of the environment on the organism are children.

Proof of this is found in the tendency to deterioration of the general physical health of children (increased prevalence of diseases by 23,0-42,0% for 2001 - 2012), which is associated with adverse factors that include the living conditions and lifestyle. Noteworthy is the significant increase in diseases, defined as the adaptation markers that are closely associated with the dentoalveolar abnormalities including alimentary-dependent and allergic diseases, diseases of the endocrine (including thyroid) and the musculoskeletal system and connective tissue (in 1,6-2,2 times). The frequency of the congenital anomalies and chromosomal disorders is plenty high [2, 4, 10].

It was found that the overall children's somatic morbidity correlates with dental morbidity, which also has not a significant positive dynamics. Thus, the prevalence of caries of the temporary teeth in a 6-year-olds is 87.9%, while in the EU - 20.0%; permanent occlusion in 12-year-olds - 72.3%; chronic catarrhal gingivitis among 12-15 years old adolescents - to 80.0%, and in some regions - up to 98.0%. The prevalence of anomalies of the teeth, tooth rows and bite in children ranges 11,0-88,0%, averaging 42.5% [1, 3, 5, 7, 9, 10].

So, achieving European goals of dental health of children in Ukraine requires targeted researches of adaptation of the organism and forecasting of dental diseases in children of all ages living in different anthropogenic load area. This will enable to optimize the technology of the dental health preservation and management by increasing the body's functional reserves and action on the risk factors dysadaptation.

The purpose of the research. To investigate the dental health of children living in conditions of combined negative impact of natural and technological factors.

Materials and methods. To achieve the goals and objectives of the study during 2004-2012 years it was performed an epidemiological dental examination of 2551 children

aged 6 to 15 years, who settled in different regions of the Precarpathians, in conditions of iodine and fluoride deficiency and with different geological and anthropogenic load on the child's organism (plain - 1087 children, foothills - 730 and mountain - 734 children).

Comprehensive evaluation of contamination of the environment, held by the method of Dotsenko V.M. et al., 2005 (pat. 7253 "Method of determining the quality of the environment and the risk of impact of the contamination on public health", Bul. № 6/2005), found that the total level of pollution of Ivano-Frankivsk region can be estimated as high . Based on the data of total level of pollution, the settlements were divided into very polluted (plain and foothill regions - pollution index> 1 USD) and low polluted (mountain region - pollution index <1 USD).

For an objective rating of the degree of reliability of the research results it was conducted a statistical processing of the data, the basis for the electronic data base. Later they worked out using the program Microsoft Excel, which is part of the Microsoft Office programs and the program Statistica. When performing statistical analysis of the data was used the following methods: analysis of variational series, rating the probability of the results, the calculation of pair correlation coefficients, carrying logistic regression analysis.

The research was conducted with the main provisions of GCP ICH and the Helsinki Declaration on Biomedical Research, where a person acts as the subject, and following its views (Seoul, 2008), the European Convention on Human Rights and Biomedicine (2007) and the recommendations of the Committee on Bioethics of the Presidium NAMS Ukraine (2002) for the endorsement of the committee on bioethics of SHEI " I.Y. Horbachevskyy Ternopil State Medical University of Ministry of Health of Ukraine " (extract from the minutes of 01.04.2013 № 17). The violations of ethical standards during the survey were not found.

Results and discussion. As a result of the research it was found the low level of dental health of all children regardless of the region of residence (fig. 1).

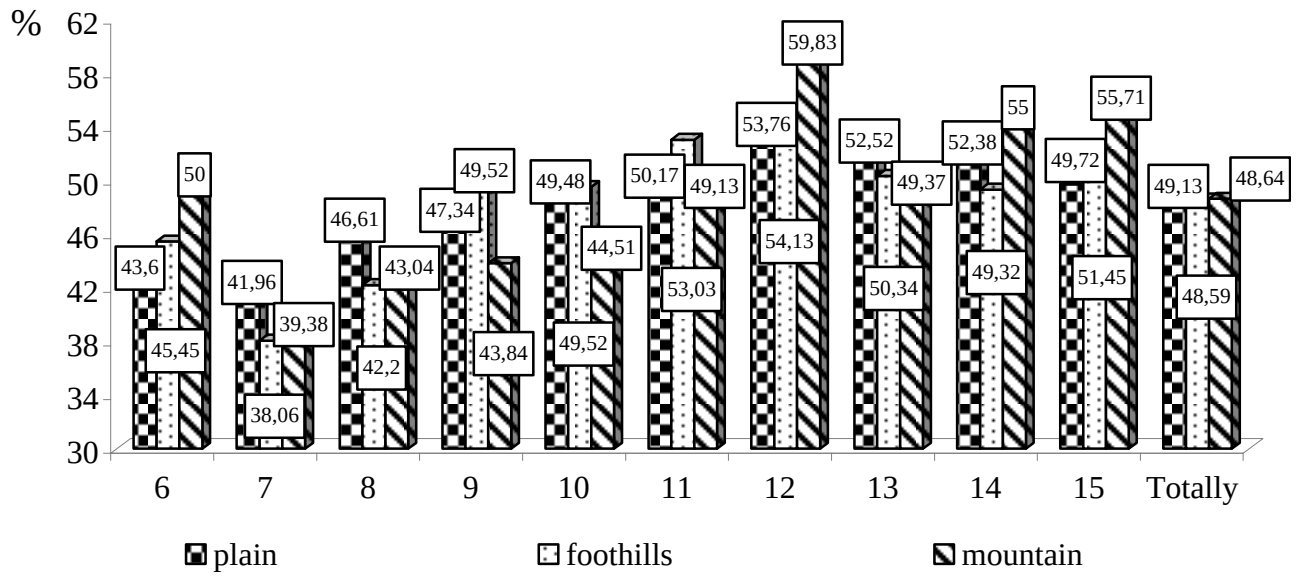

Fig. 1. The level of dental health of the child population of the Precarpathians

On average in the region of the level of dental health was (48,83 ± 0,36)% and it was statistically the same in all areas of the region, p> 0.05. The highest level of dental health was detected in a 12-year-olds of the region, which was (55,43 ± 1,31)% and ranged from (53,76 ± 2,11)% of the examined children of ecologically unfavorable plain region to (59,83 ± 2,09)% of children of the relatively clean Precarpathian mountain region. This can be explained by the fact that at this age has already held the replacement of temporary teeth, which make a significant contribution to the reduction of dental health of children, and the formation of permanent occlusion stars accompanied by processes of self-regulation.

Despite the fact that the overall data of the level of dental health of children in every examined region have no significant difference, the age study suggest a different state of dental health of children depending on the geochemical and anthropogenic environmental conditions. Thus, in children under 12 years the level of dental health was higher in anthropogenically disadvantaged plain regions compared to the relatively pure mountain region, and after the age of 12 - on the contrary.

Regarding sex differences of the level of dental health, the higher data were established only in the boys of mountainous region in age groups of 10 (48,29 ± 2,29)%, p <0.05 and 13 (56,86 ± 3,57)%, p <0.01, compared to those of girls (40,73 ± 2,30) and (45,00 ± 1,97)%, respectively.

In the group of girls, who lived in three different regions, the differences of data were found in the age groups of 10 years (p <0.01) and 12 years (p <0.05). Note that in the age

group of 10 girls of the mountain region had the lowest level of dental health (40,73 ± 2,30) to (50,61 ± 2,23)% in the flat and (50,98 ± 1,97)% of foothill regions, but in the age group of 12 years in girls mountain region, the figure was the highest (61,03 ± 2,95) compared to (50,00 ± 2,66)% in the plain and (50,50 ± 3,81)% in foothill regions).

Therefore, the low level of dental health in child population of Ivano-Frankivsk region, regardless of the place of residence, prompted us to study the factors that contribute to its reduction. Analyzing the structure of the level of dental health we see that the main place in its formation belongs to dental caries and dentoalveolar abnormalities, as evidenced in researches of other researchers, who conducted research in other regions of Ukraine [1 5, 7, 8, 9, 10]. Therefore, when chosing the object of research we stopped at one of the most serious and poorly understood pathology of the dentoalveolar system, such as dentoalveolar abnormalities that make a significant contribution to the formation of level of dental health.

Studies have shown (Fig. 2) that the majority of children in Ivano-Frankivsk region have the dentoalveolar abnormalities (60,80 ± 0,97%). It was found a difference between the prevalence of dentoalveolar abnormalities frequency in children of the region, living in three different regions of anthropogenic load, all examined age groups together ($p < 0.001$). The lowest rates of frequency of the dentoalveolar abnormalities were registered in relatively pure mountain region (45,91 ± 1,84)%, and the highest - in polluted plain region (67,99 ± 1,42)%. The prevalence indicator of dentoalveolar abnormalities among children residing in the mountainous region, was (65,21 ± 1,76)%.

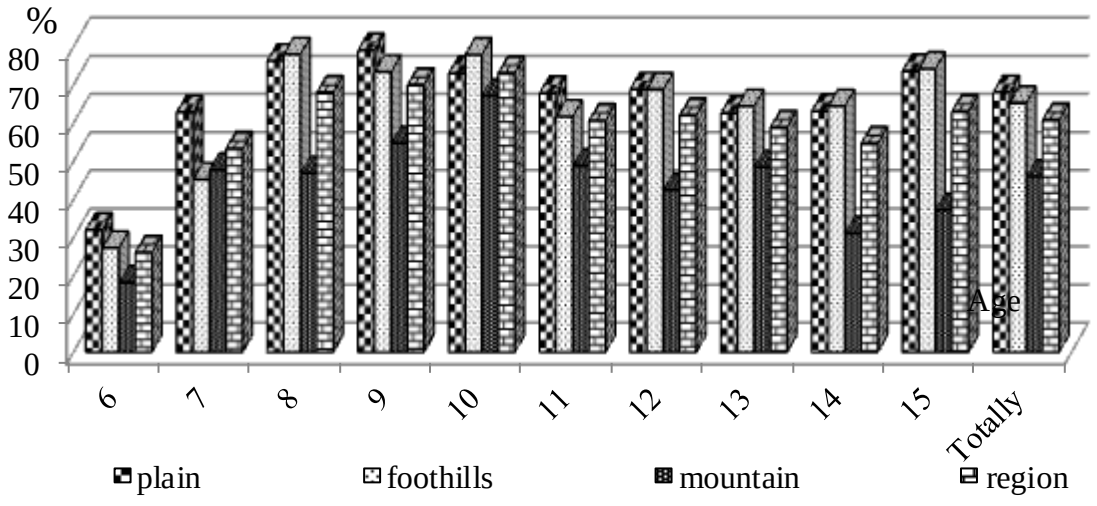

Fig. 2. The prevalence of dentoalveplar abnormalities in children of Ivano-Frankivsk region

The comparison of a prevalence data in children of three different regions of residence in different age groups showed the differences between age groups of 8 years (frequency of dentoalveolar abnormalities in children of plain region was (76,27 ± 3,93)%, foothill (77,97 ± 5,44) %, and mountain (46,84 ± 5,65)%, p <0.001), 9 years (79,03 ± 3,67), (73,33 ± 5,76) and (54,65 ± 5,40) % respectively, p <0.01), 12 years (68,82 ± 4,83), (68,75 ± 5,21) and (42,37 ± 6,49)%, respectively, p <0.05), 14 years and 15 years (p <0.001). In all age groups of children of both sexes the lowest rate of dentoalveolar abnormalities was observed among the inhabitants of the mountain region.

In the general observation in the boys who live in different areas of the region, the lowest prevalence of dentoalveolar abnormalities was found in the mountainous region (44,25 ± 2,66)%, the highest - in the plain (68,52 ± 1,96)%, (p < 0.001). Dentoalveolar abnormalities prevalence in boys of foothill region was (67,54 ± 2,40)%, p <0.001. In the field of girls who lived in three different regions, there was a similar trend: the lowest prevalence of dentoalveolar abnormalities was registered in the mountainous region (47,41 ± 2,54)%, the highest - in the plain region (67,42 ± 2,04)% and intermediate frequency takes place in girls of foothill region (62,64 ± 2,59)%, (p <0.001).

Figuring on the high prevalence of teeth anomalies in children of Ivano-Frankivsk region and their significant impact on reducing the level of dental health it was studied the structure of dentoalveolar abnormalities depending on region of residence. The comparison of structure of children's dentoalveolar abnormalities showed differences (p <0.001) in the distribution of species of dentoalveolar abnormalities depending on anthropogenic, geochemical and environmental conditions. The highest frequency of anomalies occupied the anomalies of teeth rows (from (69,73 ± 1,42)% in children of the mountain region up to (62,69 ± 1,78)% of children in the plains region (p <0.05). The most favorable for proper dental formation are mountainous region of residence. In these children, combined anomalies of bite and teeth rows, the most complex pathology (12,17 ± 1,78)%, there are almost 2 times less than in the plain (24,09 ± 1,57)% and foothill (22,06 ± 1,90)% regions (p <0.001). The most vulnerable in terms of appearance of the dentoalveolar abnormalities period is 6 to 8 years, in which there was found a significant increase in the number of children with dentoalveolar abnormalities: (26,09 ± 3.75) in 6 years group and (67,97 ± 2,92)% in 8 years, p <0.001.

The results show that the high frequency of dentoalveolar abnormalities is more associated with anthropogenic living conditions that are more adverse in plain and foothill

regions. All the above led to a more detailed examination of the issue in order to plan preventive measures for children, who live in different anthropogenic conditions.

Among the factors that contribute to the development of the dentoalveolar abnormalities and lower level of dental health the dental caries and its complications play an important role, especially early tooth extraction resulting in widespread caries process, and vice versa, teeth and jaws abnormalities lead to tooth decay and periodontal tissue diseases as a result of difficult oral hygiene, which plays a decisive role in the etiology of these diseases. So it was analyzed the connection of dentoalveolar abnormalities with the development of caries, periodontal tissue diseases and hypoplasia of tooth enamel, which constitutes a violation in the formation of tooth and bone tissues.

The comparison of the prevalence of dental caries in children of separate age groups with and without dentoalveolar abnormalities showed a significant difference between the rates in the age group of 9 years. In the nine years old children who had not dentoalveolar abnormalities prevalence of caries was higher (100.0%) than in children who had dentoalveolar abnormalities, (94,71 ± 1,63)%; ($p < 0.05$). A comparison of these parameters in children of different age groups and different regions showed the difference between them only in the age group of 13 years in the plain region (96,55 ± 1,97) to (86,45 ± 4,78)%; ($p < 0.05$) and in the age group of 14 years in the mountainous region (82,61 ± 8,08) compared to 100%; ($p < 0.01$).

Among children with dentoalveolar abnormalities, the difference between the prevalence of dental caries has not been established. Among children of different age groups with dentoalveolar abnormalities difference between the prevalence of caries were established only in the age groups of 10 ($p < 0.05$), 13 ($p < 0.01$) and 14 years ($p < 0.05$). Thus, a group of 10-year-olds who had dentoalveolar abnormalities, the lowest prevalence of dental caries among children was registered in a foothill region (88,89 ± 3,51) compared to (92,73 ± 3,53)% in mountain and (95,24 ± 2.34)% in plain regions; in the group of 13-year-olds the lowest rate was registered among children of the mountainous region (86,96 ± 5,02) compared to (96,55 ± 1,97)% of plain and 100.0% of foothill regions; in the group of 14-year-olds with dentoalveolar abnormalities, the lowest prevalence of dental caries among children was registered in the mountainous region (82,61 ± 8,08) compared to (94,81 ± 2,55)% of plain and (97,87 ± 2,13) % of foothill regions.

The comparison of the intensity of caries among children of all age groups showed no difference in performance between children with and without dentoalveolar abnormalities as in the whole region and for each of the three regions, as well as children of certain ages.

Among the surveyed children of the area with dentoalveolar abnormalities was established difference between the indices of intensity of caries in children of different regions ($p < 0.001$); the highest index was registered in the mountainous region (5,42 ± 0,18) of carious tooth, the lowest - in the plain region (4.34 ± 0,10) of carious tooth. The indicator of intensity of caries in children of foothill area of the region was (4,94 ± 0,10) of carious tooth. Among the children of the region who had dentoalveolar abnormalities, the difference between the intensity of caries in children of different regions have not been registered.

The analysis of intensity of caries in children of different age groups and regions of residence with dentoalveolar abnormalities found the difference between these parameters in children of following age groups: 8 years ($p < 0.01$), nine years ($p < 0.001$), 12 years ($p < 0, 05$) and 15 years ($p < 0.01$). In the eight-year and nine-year children of the region, who had dentoalveolar abnormalities the intensity of decay was the highest among the inhabitants of the mountain region (7,35 ± 1,48) and (7,49 ± 0,48) of carious tooth, and the lowest - among the inhabitants of the plains region (5,22 ± 0,31) and (5,02 ± 0,28) of carious tooth, and in groups of 12- and 15-year-olds the highest intensity of decay was registered in the foothills region (4,13 ± 0,41) and (6,20 ± 0,40) of carious tooth, the lowest - in the plain region (2,86 ± 0,22) and (4,28 ± 0,31) of carious tooth.

Dentoalveolar abnormalities are one of the factors that contribute to the emergence and development of periodontal tissue diseases in children. Studies have shown that periodontal disease prevalence in children of Ivano-Frankivsk region with dentoalveolar abnormalities is (89,95 ± 0,76)%, which is significantly higher than in children without dentoalveolar abnormalities (78,18 ± 1,31)%, $p < 0.001$. The most favorable condition for periodontal tissues are the mountain region of residence, but in all regions of residence the periodontal disease encountered significantly more often in children with dentoalveolar abnormalities than without them.

Conclusion. Thus, the performed research established a low level of dental health of children living in various anthropogenic conditions of the Precarpathians that led to the study of adaptation abilities of children using the technique of systematic approach, which is that each system is studied considering both internal connections between the individual elements and external - with other systems.

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