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## DEFINING THE RELATIONSHIP BETWEEN CARIES INTENSITY AND CHEMICAL COMPOSITION OF WATER IN UZHGOROD AND V.KOPANYA

*Bilynskyi O.Ya., Dobrovol'ska M.K., Kostenko S.B.*

*Uzhgorod National University Faculty of Dentistry, Therapeutic Dentistry Department, Uzhgorod*

**Summary :** Both water samples met regional standards, although the composition of micronutrients was quite low. Despite the diverse composition of water in V.Kopanya and Uzhgorod and content of macro- and micronutrients that affect the formation of carious lesions, we did not detect the difference in the intensity of the disease, which reached 6.5 and 6.3 in this regions.

**Key words :** tooth decay, water composition, twins, caries intensity

**Actuality of topic.** Caries is a complex, multifactorial disease which depends of carbohydrate-rich food, hygiene of oral cavity and water chemistry. According to epidemiological studies, the prevalence of tooth decay in young people Transcarpathian region reaches more than 90% (according to N.I. Smolar, Bezvushko E.V., Chukhrai N.L., Melnychuk N.I., 2012) [7]

Transcarpathian region - endemic region in Ukraine, which is characterized by a pronounced deficiency of many

micronutrients [4, 8]. Micronutrients are the part of many biostructures, including active sites of certain enzymes that are involved in important biochemical processes - redox reactions catalyzed by enzymes containing ions of a number of macro- and micronutrients, synthesis of proteins, etc. [1, 2]

In addition, the study area has a lot of mineral water springs of their different composition. The study [3] indicate the presence of certain features common diseases and exchanging of certain micronutrients in the population of Transcarpathia depending on the use of different types of water.

In nature, water is never found as a pure chemical compound. With universal solvent properties, it always has a wide variety of elements and compounds, composition and value are determined by the conditions of water formation, composition of soil and rocks.

**The main aim** was to conduct comparative characteristics of the relationship between the intensity of caries and chemical composition of water in young people of Uzhgorod and V.Kopanya [6].

**Material and methods.** We made dental examination of 9 pairs of twins 12 years age of V.Kopanya and 18 children of the corresponding age of Uzhgorod. We studied the physical and chemical composition of water in this settlements. We examined caries intensity (DMF index) and hygienic indices Green-Vermilion and Fedorov-Volodkina.

For analysis, water samples were taken in August 2016. The study included the determination of the chemical composition, hardness and pH (pH) indicator. Macronutrients determined by chemical analysis. Qualitative and quantitative composition of micronutrients evaluated by atomic absorption method (a spectrophotometer C-115M1, Register of Ukraine U60036-99 number). The acid-base indicator (pH) was measured using a pH meter Ezodo 5011 (GOnDO Electronic Co, Taiwan)

**Results and discussion.** All examined children were divided into 2 groups: the first group consisted of persons of V.Kopanya

and second one from Uzhgorod. In the first group were determined by questioning the low level of hygiene education, hygiene index Fedorov-Volodkina, ranging from 1.9 to 3.4 points, on average was 2.7. Hygiene index indicator Green-Vermilion ranged from 1.4 to 1.8, the DMF index averaged 6.5, which corresponds to a high level of intensity of caries. After the examination of the second group also found high levels of the DMF index, equal to 6.3, the level of hygiene index by Fedorov-Volodkina, amounted to an average of 2.3 points and 1.4 by Green-Vermilion.

In both cases, water is a clear, colorless, odorless, pleasant to the taste liquid. Water

hardness was respectively 0.58 mEq/dm<sup>3</sup> for V.Kopanya and 6.0 mEq/dm<sup>3</sup> to Uzhgorod. From the Table 1 results of chemical analysis of water samples of macronutrients the highest content was calcium ions. In the relatively lower concentration of water present magnesium ions and ammonium. Anions were fluorides, sulfates, chlorides and nitrates. In the water, there are important minerals for the human body as zinc, iron, manganese, copper. The content of dry residue, which was determined in water samples of V.Kopanya, equal to 54.5 mg / dm<sup>3</sup> and 100 mg / dm<sup>3</sup> to Uzhgorod. pH of the water of V.Kopanya was 6.55, and for Uzhgorod the level was 6.93. (Table 1.).

Table 1

Characteristic	Results V.Kopanya	Results Uzhhorod	ND STATE STANDARDS 2.2.4-171-10 rate(notmore)
<b>General indicators</b>			
Hardness, mEq / dm <sup>3</sup>	0,58	6.0	7,0 (1,5-7,0) *
The dry residue mg / dm <sup>3</sup>	54,5	100	1000 (200-500) *
pH	6,55	6,93	6,5-8,5
<b>Macronutrients, cations, mg / dm<sup>3</sup></b>			
Calcium (Ca <sup>2+</sup> )	6,42	4,5	130 (25-75) *
Magnesium (Mg <sup>2+</sup> )	1,7	1,5	80 (10-50) *
Sodium (Na <sup>+</sup> )	1,65	1,31	200 (2-20) *
Ammonium (NH <sub>4</sub> <sup>+</sup> )	0,09	0,04	0,1
<b>Anions, mg / dm<sup>3</sup></b>			
Chlorides (Cl <sup>-</sup> )	4,95	45.0	250
Sulphates (SO <sub>4</sub> <sup>2-</sup> )	4,20	22.4	250
Nitrates (NO <sub>3</sub> <sup>-</sup> )	0,45	21.6	45
Fluorides (F <sup>-</sup> )	0.15	0.03	1.2
<b>Micronutrients, mg / dm<sup>3</sup></b>			
Zinc (Zn)	42	10	1000
Iron (Fe)	34	9	200
Magnase (Mn)	4	9	50
Cooper (Cu)	3	17	1000

**Conclusions:** According to the results of chemical analysis, studied water of V.Kopanya characterized by low content of macro- and micronutrients. Their average value in order much more lower than maximum permissible concentration determined by the applicable requirements of regional standards [5]. The Mynayskyi water

catchment area of Uzhgorod contains much more chlorides, sulfates and nitrates opposite to samples of water in village V.Kopanya, but meets the standards defined by the sanitary service of Ukraine. As for pH, studied water has weakly acidic (pH 6.55, 6.7 and 6.93), although it is within (6,5-8,5) established by existing regulations for drinking water.

Despite the diverse composition of water in V.Kopanya and Uzhgorod and content of macro- and micronutrients that affect the formation of carious lesions, we did not detect the difference in the intensity of the disease, which reached 6.5 and 6.3 in V.Kopanya and Uzhgorod. Summarizing the

above, we can conclude that the chemical composition of water affects the development of caries as its level in the study group meets high level, but argued that it is decisive we can't, because we were not studied other risk factors.

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