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Results of The Epidemiological Survey of Dental Health In 13-Year-Old Children Evaluated in Compliance with The European Community Health Indicators (Data for The City of Voronezh, Russia).

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ABSTRACT

The method of analytical epidemiology was used to analyze the informativity of a number of significant European Community Health Indicators applied to evaluate Voronezh children's dental health in accordance with their dental status and the findings of the anonymous questionnaire survey among 116 schoolchildren aged 13. The explored indicators may be used to maintain control over dental disease primary prevention programs at the community level and to estimate the treatment effects.
Keywords: oral health indicators, prevention programs, children's dental health.

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INTRODUCTION

Regular monitoring of the level of dental health in children is a key component of the public healthcare system [20]. A number of epidemiological studies favouring determination of tendencies for dental diseases to progress as well as evaluation of primary prevention programs effectiveness have been conducted in the Russian Federation over the last 50 years [1, 2, 5, 6]. The principle criterion for children's dental health is traditionally considered the DMFT (total number of decayed, missing and filled teeth) index. Many other indices for dental status and/or factors affecting it are practically incomparable at the international level due to a variety of methods and criteria. According to Bourgeois D. [14], there are more than 600 different criteria used in global epidemiological surveys aimed at dental diseases monitoring. Moreover, the generally accepted DMFT index becomes less recognizable in present-day scientific literature: the D^1MFT index (the DMFT index considering initial caries), the D^3MFT index (dentine caries), the SiC index (The Significant Caries Index) and others appear [12]. The problem of the unification of assessment of periodontal (or parodontal in the Russian version of the International Terminology for Periodontal Diseases) status in adults and children is even more complicated [19]. The CPITN (Community Periodontal Index of Treatment Needs) criterion is practically rejected. The World Health Organization and the European Commission for Health recommend a gingival bleeding index in children and a periodontal attachment loss index in adults instead [14, 21]. There the measurement of the oral hygiene index and the index of dental patch and stone evaluating the population's dental status at the community level is not recommended.

The European Commission for Health with the involvement of the WHO dental programs director suggests 40 most essential dental health indicators, which make it possible to estimate the main criteria for dental status and to identify behavioural and other risk factors affecting it [14]. New «tools» for epidemiological studies, such as 2013 WHO case investigation forms and questionnaires, have been developed. Dental health surveys with the use of the European Community Health Indicators were conducted in 27 EU countries [15] and made it possible to give a reasonable estimate of the achievements and challenges in dentistry of European countries. The informativity of the European Community Health Indicators in evaluation of dental health in school-aged children from the city of Voronezh has not been studied so far.

The objective of the present research is to determine the specificity and informativity of the European Community Health Indicators for comparative assessment of dental health among school-aged children from the city of Voronezh, RF.

MATERIALS AND METHODS

A team of experienced and clinically calibrated pediatric dentists performed standard procedures of dental examination and anonymous questionnaire survey among 116 13-year-old schoolchildren from three randomly chosen Voronezh schools with the use of 2013 WHO case investigation forms and questionnaires. In the course of the survey, the following indices were recorded: the DMFT index for permanent teeth, the Green-Vermillion oral hygiene index (OHI-S) and the gingival bleeding index. The 2013 WHO modified anonymous questionnaire contained 10 questions with multiple choice answers. In brief, the questions covered the following: subjective assessment of the teeth appearance and condition; tooth pain occurrence; visits to a dentist and reasons; tooth brushing frequency and a toothpaste name; fresh fruit and sweet products consumption. The obtained data were analyzed by determining average values of the dental status indices, the percentage of answered questions and a possible influence of behavioural factors on the condition of teeth and gums as well as the European Community Health Indicators' applicability to evaluate dental health in children.

RESULTS AND DISCUSSION

The main results of the present study are gathered in the Table. In the system of the European Community Health Indicators, dental status in children is primarily evaluated according to the indices: the percentage of healthy (caries free) children (Indicator B-12) and the average DMFT index (Indicator B-13) in key age groups. The caries prevalence is considered a less informative indicator though it is closely associated with one of the main indicators – Indicator B-13. Our data show that the mean DMFT index for permanent teeth in the examined 13-year-old schoolchildren from Voronezh is 2.37±0.03, which, according to the WHO standards (WHO-2013), falls within a low level of dental caries intensity. On average (Kuzmina E.M., 2009), in

many regions of the Russian Federation, the prevalence of dental caries among school-aged children is significantly higher (Picture 1).

It should be noted that the index of caries intensity – the DMFT index for permanent teeth – ranges in the chosen cities and, evidently, indicates different effectiveness of applied preventive measures. However, such a conclusion cannot be considered well-founded without an appropriate assessment of other indicators. In EU countries, dental status in children is generally evaluated using the Indicator B-12 instead of the dental caries prevalence factor. In Voronezh, only 3% of the examined children had no decayed teeth. Thus, our findings have shown rather high informativity of «the percentage of healthy (caries free) children» indicator, which allows comparing the data at the international level.

In the recent years, the Significant Caries Index (the SiC index) has been widely used in descriptive and analytical epidemiology as it determines the proportion of children who are in a high-risk group for dental caries [12]. In our survey project, the mean SiC index among the examined 13-year-old schoolchildren was 1.82 or 0.55 lower than the mean DMFT index for permanent teeth in children of the same age group. According to international dental literature, the SiC index is usually two and more times higher than the mean DMFT index (Picture 2). Evidently, the data of the present research reveal true-to-fact absence of children at high risk of developing dental caries. A relatively low degree of dental caries intensity in Voronezh schoolchildren aged 13 serves to prove the revealed tendency.

The next simple and easily measured objective criterion for dental health evaluation is a proportion of the «D» (decayed teeth) component in the DMFT index (Indicator B-9). The «D» component in the examined 13-year-old children was 1.23 representing 52% of the mean DMFT index. Picture 3 illustrates the results of the research compared with the similar data for the RF. It is evident that the findings obtained in the given pilot project show the B-9 Indicator specificity and high informativity for identification of potential problems in regular dental care delivery to children in Voronezh as well as throughout the RF. Thus, the B-9 Indicator – the percentage of untreated caries – may be used for quite objective estimation of the quality of dental services rendered to children.

The Green-Vermillion oral hygiene index (OHI-S) among the examined 13-year-old schoolchildren was 1.1 in girls and 1.5 in boys respectively. It does not seem possible to compare these findings with the data for EU countries as the list of significant European criteria and recommendations by the WHO in 2013 does not cover oral hygiene assessment despite the fact it is known to be directly associated with the prevalence of periodontal diseases. Within the framework of the present project we studied one of the diagnostic criteria – gingival bleeding (Indicator B-14) and its possible correlation with the risk indicator – the oral hygiene level. So, for example, gingival bleeding was detected in 3% of 13-year-old girls and in 6.2% of boys. The differences coincided with different values of the oral hygiene index (OHI-S) in boys and girls: 1.1 and 1.5 respectively (Picture 4). Thus, we could observe the tendency to a larger proportion of children with gingival bleedings related to poor oral hygiene, which affords ground to consider this indicator rather informative for evaluation of periodontal health in adolescents. These observations agree with the data of scientific literature on evidence-based associations between poor oral hygiene and periodontal diseases in children. The WHO has recommended the Indicator B-14 to measure the prevalence and intensity of periodontal diseases in children and adolescents (WHO, 2013).

The results of the anonymous questionnaire survey using the European Community Health Indicators among 13-year-old schoolchildren have given demonstrative and clear evidence of the consequences of poor oral health. Indeed, 4% of the examined children felt embarrassed about smiling because of their teeth appearance (Indicator D-4), which has been proved to have a negative impact on the schoolchildren's life quality. It must be said that the same problem is relevant for EU countries that report a higher level of pediatric dental health care (Picture 5).

The subjective indicator D2 (toothaches in children) is not of less importance. In the last 12 months, 69% of the interviewed children have experienced toothaches. As a comparison, only 9% of children from EU countries have had the same problem (Picture 6). It should be taken into account that the proportion of school-aged children visiting a dentist regularly in Voronezh is, on average, the same as in EU countries. Analyzing this indicator, it is fair to assume that children's dental examinations as well as medical and

preventive measures have not been highly effective for early detection and immediate treatment of dental diseases.

One of the most significant subjective indicators associated with a healthy lifestyle is compliance with the recommended twice-a-day brushing regimen (Indicator A-1). The anonymous questionnaire survey has revealed that 53% of 13-year-old schoolchildren comply with the recommended brushing regimen, which is much higher than in certain regions but still less than the «gold standards» that are common for Germany and Switzerland where dental caries in children is being reported to come into the category of rare diseases (Picture 7). Analyzing the data, it is believed that the Indicator A-1 is quite informative but it can be used only in combination with other objective and subjective indicators of children's dental health.

Table 1. The Indicators of Dental Health in 13-year-old Children from Voronezh, 2014

Objective indicators (dental status data)

CodesEGOHID	I n d i c a t o r s	Figures
B12	The percentage of healthy (caries free) children The Green-Vermillion oral	3
B14 B12	hygiene index – OHI-S	1.3
B13 B9 B17	The gingival bleeding index (% of the examined)	4.3
B13 A12	The prevalence of dental caries (%)	97 2.37
	The mean DMFT index for permanent teethUntreated caries: the mean «D»	1.23 (52%)
	and % of the DMFT index	10
	Missing permanent teeth: number of teeth per 1000 children	1.82
	The SiC index (The Significant Caries Index)	10% (F2)
	Dental fluorosis: % of children and severity according to the TFINeeds for	93%
	prevention and/or non-emergency treatment	11%
	Needs for emergency dental treatment	

Subjective indicators (questionnaire survey data)

A1 A4	Tooth brushing two times a day	53%
B2 B1	Using a fluorine-containing toothpaste	43%
B1 B5	Rare or regular smoking	5%
B6	Daily consumption of sweet products	43%
D4	Daily consumption of sugary drinks	28%
D4	Regular visits to a dentist in the last 12 monthsVisits to a dentist caused by	70%
D4	a toothache	14%
D2D5	Self-reported condition of the teeth:	93% / 2%
	excellent or good / bad	63%
	Satisfaction with the teeth appearance Avoidance of smiling due to the	4%
	teeth appearance Suffering from toothaches in the last 12 months	69%
	Missing classes because of a toothache	10%

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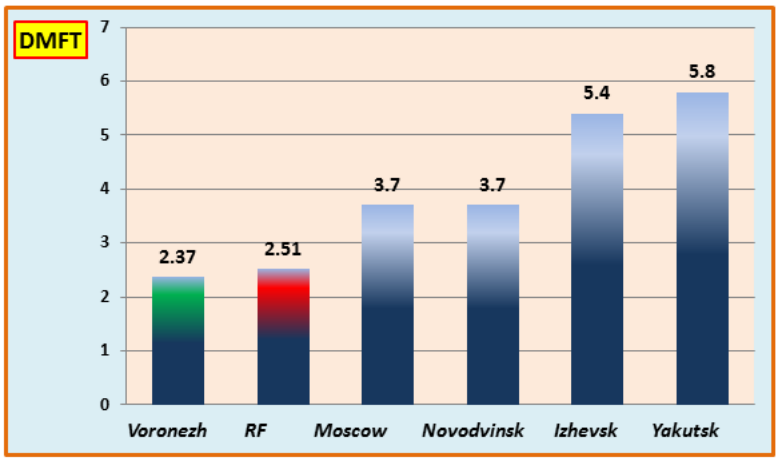
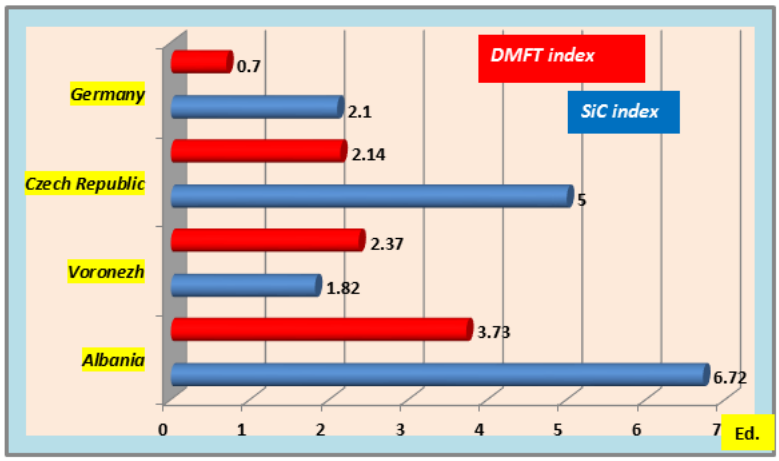
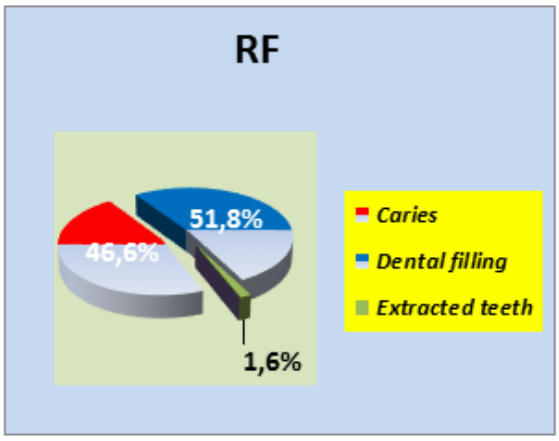


Picture 1.The Comparative Data on the Mean DMFT Index in 12-15-year-old Children (Indicator B-12) in Particular Regions of the RF .*Voronezh: 13-year-oldchildren; RF: 12-year-old children (YanushevichO.O. et al.,2014); Moscow: 12-year-old children (KuzminaE.A., 2014); Novodvinsk: 12-year-old children (GorbatovaM.A. et al., 2014); Izhevsk: 12-15-year-old children (TimofeevaA.A., 2014); Yakutsk: 12-year-old children (Ushnitsky I.D. et al., 2014).*



Picture 2. The Correlation of the Mean DMFT Index and the SiC Index for Permanent Teeth in 12-13-year-old Children from Voronezh and Some European Countries:
Albania [16], Germany [17], Czech Republic [13].



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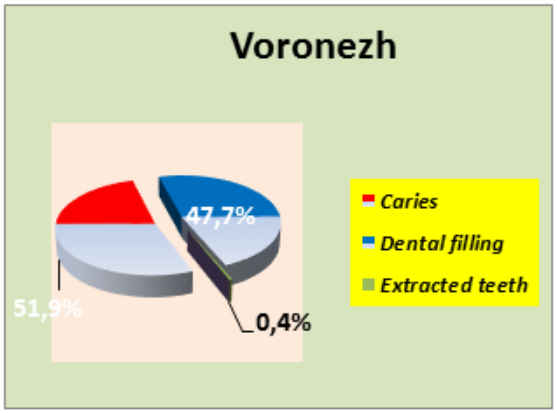
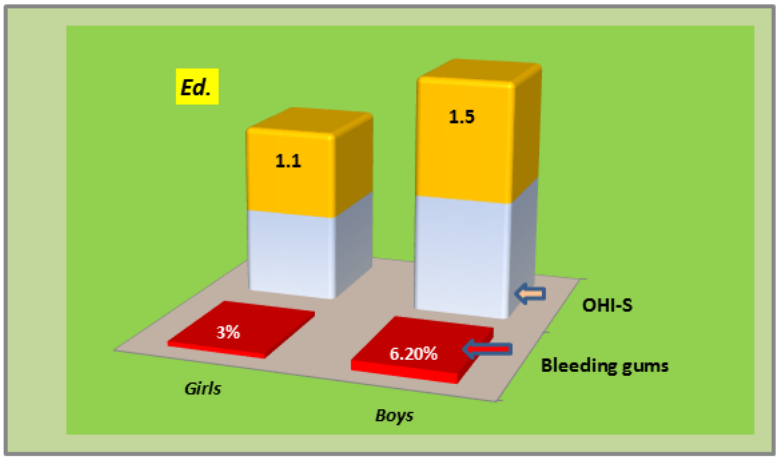
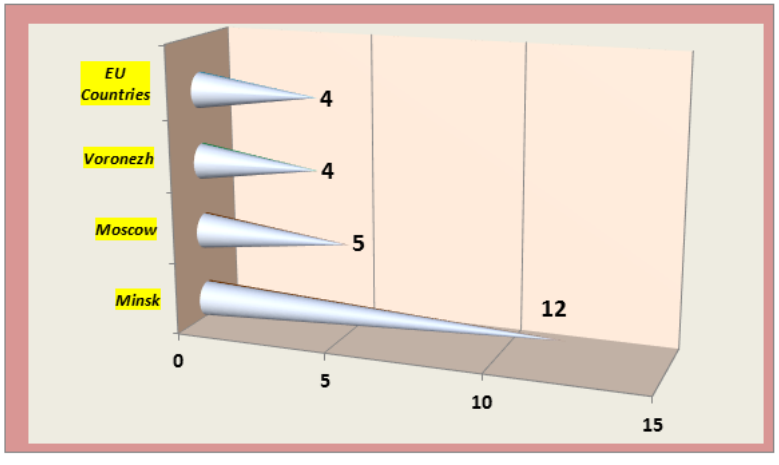


Picture 3. The Structure of the DMFT Index for Permanent Teeth in 12-year-old Children from the RF [5] and 13-year-old Children from Voronezh, RF, 2014 r.



Picture 4.Possible Correlations between the Prevalence of Gingival Bleeding (Indicator B-14) and the Oral Hygiene Level in School-Aged Children from Voronezh.



Picture 5.The Proportion of 13-15-year-old Schoolchildren Feeling Uncomfortable in Interpersonal Relations due to the Teeth Appearance.

The Data for EU: Euro Barometer, 2010 [15]; Moscow [8];Minsk [7].

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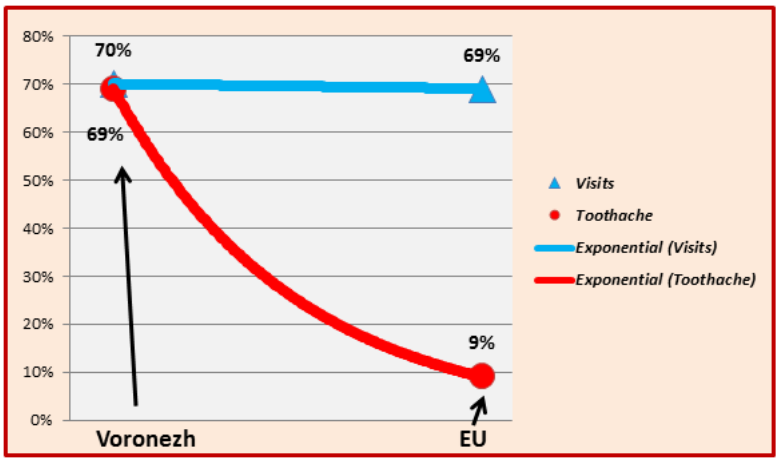
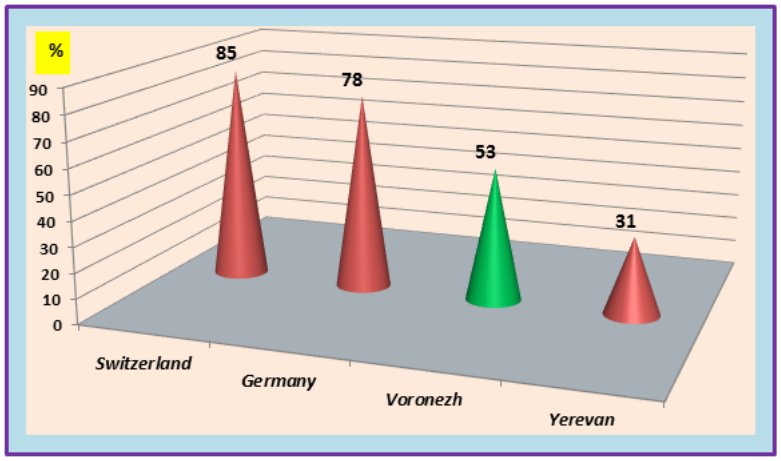


Picture 6. Possible Correlations between the Proportion of School-Aged Children Visiting a Dentist Annually (on a Regular Basis with the aim of Preventive Maintenance) and the Percentage of School-Aged Children who Have Experienced a Toothache in the last 12 months.

The Data for EU: Euro Barometer, 2010 [15].



Picture 7. The Percentage of 13-15-year-old Schoolchildren Complying with the Recommended Twice-a-Day Brushing Regimen.

The Data for Germany and Switzerland [18],for Erevan [7].

CONCLUSION

The present research evaluates the informativity of a number of the European Community Health Indicators of dental health among 13-year-old schoolchildren from Voronezh according to the following criteria: the percentage of healthy children, the average value of the DMFT index and its components, the prevalence of gingival bleeding, the oral hygiene index as well as a number of subjective criteria related to behavioural habits. The tools used in this research included the new 2013 WHO case investigation form and questionnaire.

The European Community Health Indicators of dental health may be used in the healthcare system and research projects to exercise control over the effectiveness of primary prevention and the quality of dental services rendered to children. They allow performing a comparative analysis of similar indicators in EU countries and all over the world and may contribute to the unification and objectification of the monitoring system and, consequently, to the improvement of children's dental health.

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