

N.I. Latyshevskaya, V.F. Mikhalechenko, T.L. Yatsyshena,
L.A. Davydenko, E.L. Shestopalova

REGIONAL CHARACTERISTICS OF PERMANENT TEETH ERUPTION IN VOLGOGRAD SCHOOLCHILDREN

The physical development assessing, reflecting the formation of morphological and functional properties of the organism is the most important part of the children health studying. One of the criteria for a child's biological development is tooth maturity. Dental maturity as a criterion of biological age is determined by the timing of the milk and permanent teeth eruption. At the same time, the overwhelming majority of hygienic work on the assessment of regional characteristics of children's physical development contains information on morphofunctional indicators: length and body weight, chest circumference, muscular strength of the hand, lung capacity, but very rarely provide information about "dental age". Analysis of the results of assessing the morphofunctional state of schoolchildren using the local standard is preferable for preventive medicine, including for developing priority health measures for this category of the population.

The **objective** of the investigation was to identify the characteristics of the permanent teeth eruption in the Volgograd schoolchildren, to compare the obtained data with the dynamics of anthropometric indicators (height, body weight), taking into account gender differences; to analyze the differences in the indicator "permanent teeth eruption" in different regions of the country (according to literary sources). The number and timing of the permanent teeth eruption in Volgograd schoolchildren from 7 to 17 years old were estimated. The differences in number and timing of the permanent teeth eruption in comparison with similar indicators in regions with other climate, socio-economic, ethnic and ecological peculiarities were identified. The relationship between the timing of the permanent teeth eruption and dynamics of somatometric parameters was established. The necessity of the permanent teeth eruption standards development and the usage of this indicator in assessing the physical development of schoolchildren are justified.

Conclusions: it is necessary to include standards for the permanent teeth eruption in regional standards for the physical development of children and adolescents. During preventive medical examinations of minors, it is necessary to indicate not only the sexual development formula of the child, but also the terms of the permanent teeth eruption. According to the teething indicators in different regions of the country, differing in climatic-geographical, socio-economic, ethnic and ecological characteristics, it is necessary to develop standards and further studying the characteristics of the eruption process for each region in Russia.

Keywords: physical development, dental maturity, permanent teeth eruption, somatometric indicators, morphofunctional status.

Introduction. The physical development assessing, reflecting the formation of morphological and functional properties of the organism is the most important part of the children health studying.

LATYSHEVSKAYA Natalya Ivanovna - Doctor of Medicine, full Professor, the Head of the department for Hygiene and Ecology FGBOU "Volgograd State Medical University", Volgograd, 400131, Glazkova Avenue 1-16, Latyshnata@mail.ru 89377023030, **MIKHACHENKO Valery Fedorovich** - Doctor of Medicine, full Professor, Professor of the Department for Therapeutic Dentistry FGBOU VO "Volgograd State Medical University", Volgograd, 400048, Zhukova Avenue 127-42, vefmed@rambler.ru, 89023810014, **YATSYSHENA Tatyana Leonidovna** - candidate of medical sciences, associate professor of the department for Hygiene and Ecology FGBOU VO "Volgograd State Medical University", Volgograd, 400107, Chorosheva Avenue 48-1, tatyat@mail.ru, 89178338541, **DAVYDENKO Lyudmila Aleksandrovna** - Doctor of Medicine, full professor, Professor of the department for Hygiene and Ecology FGBOU VO "Volgograd State Medical University", Volgograd, 400131, Avenue of Heroes 5-6, Ladav52@mail.ru 89047704714, **SHESTOPALOVA Elena Livovna** - candidate of medical sciences, associate professor of the department for Hygiene and Ecology FGBOU VO "Volgograd State Medical University", Volgograd, 400131, Avenue of Heroes 4- 54, shestopalova.77@yandex.ru, 89377353535

There are various methods and scientific approaches in assessing the physical development of children and adolescents [12].

The main method of studying the physical development of children and adolescents is a comprehensive assessment in hygienic practice, firstly approved by the Civil Code of the RF SEC in 1996. Modern techniques, rules for examining and assessing the physical development of a child, as well as organized groups of children and adolescents of school age, is described in the manual for medical workers "Assessment of the physical development of children and adolescents in educational organizations" ed. by V.R.Kuchma [8]. Comprehensive assessment supposes assessing the morphofunctional status of the child (the balance development) and the level of biological development. One of the criteria for a child's biological development is tooth maturity. Dental maturity as a criterion of biological age is determined by the timing of the milk and permanent teeth eruption; biological age for school children can be determined by dental maturity before the age of 14 [1, 10]. During assessing the studied indicators from the point of their informational significance as criteria of biological age, a statistically strong direct connection of the level of biological development with

signs of puberty and the connection of the average degree - with the number of permanent teeth erupted, which characterizes them as leading informational criteria in school-age children [3, 9]. At the same time, the overwhelming majority of hygienic work on the assessment of regional characteristics of children's physical development contains information on morphofunctional indicators: length and body weight, chest circumference, muscular strength of the hand, lung capacity, but very rarely provide information about "dental age" [1]. Generally, in assessing the indicators of a child's biological development (development of secondary sexual characteristics, number of permanent teeth), the authors, as a rule, use all-Russian data.

The main question is to develop and use of regional standards for assessing the physical development of children and adolescents. According to many authors, the objective assessment of physical development is possible in the presence of "standards" in a particular region, characterized by a certain ethnic composition, climate, geographical and socio-economic conditions [4, 5, 12]. The use of other regions standards is undesirable due to differences in these indicators. Standards of physical development of children and adolescents require regular (at least 1 in 10-15 years) updates [4, 5].

Analysis of the results of assessing the morphofunctional state of schoolchildren using the local standard is preferable for preventive medicine, including for developing priority health measures for this category of the population [2].

Objective of the study: to identify the characteristics of the permanent teeth eruption in the Volgograd schoolchildren, to compare the obtained data with the dynamics of anthropometric indicators (height, body weight), taking into account gender differences; to analyze the differences in the indicator "permanent teeth eruption" in different regions of the country (according to literary sources).

Material and methods. The dentists of the children's dental treatment-and-prophylactic institutions of Volgograd carried out the study and the "dental age" assessing, including the number and timing of the permanent teeth eruption in Volgograd schoolchildren during 2015-2017 (epy patient examination was carried out in such health care facilities as: APH-CI "Children's dental clinic №2", APH-CI "Dental clinic №11", APH-CI "Dental clinic №12", APH-CI "Volzhski city dental clinic"). In total about 2,000 schoolchildren were examined, including 965 girls and 999 boys aged from 7 to 17 years. During the same period, about 3,000 schoolchildren from 7 to 17 years old were examined (1,388 boys and 1,602 girls) in order to study the morphofunctional state of children and adolescents living in Volgograd. Somatometric indicators were studied: height and body weight. The measurements were carried out according to generally accepted methods in the first half of the day. Standing body height was measured by using an wooden height meter with an accuracy of 0.5 cm. Body weight was measured with the help of lever medical scales such as Fairbanks with an accuracy of 50 g. The calculation of the main statistics - the mean value, the standard deviation, as well as the construction of regression dependencies of height and weight; analysis of the number and timing of the permanent teeth eruption in boys and girls within the age group from 7 to 17 years was carried out using the statistical package Statistica V 6. Linear pairwise correlation analysis of somatometric signs and the number and timing of the permanent teeth eruption in boys and girls conducted using MS Excel 2007.

Results and discussion. Analysis of the permanent teeth eruption in Volgograd children and adolescents of school age showed that this stage covers the period from 6-7 to 15 years. According to some authors, the period of permanent

teeth eruption is 9 years and includes two phases of active eruption (from 7 to 8 years and from 10 to 13 years) and two periods of relative rest: the first is after the first molars and incisors eruption (8 years old in girls and 8-9 years old in boys), the second is after the all permanent teeth eruption (except the third molars). In girls, it began at age 13, in boys at age 14 [3].

It was determined that the first phase of the examined schoolchildren of both sex groups was at the age of 7 years, and the most significant increase in the number of permanent teeth (intensive period of teething or the second phase) was at the age of 11 years in Volgograd boys and girls. And it is 2 years ahead of the average terms in Russia [10, 11].

To our minds, the important thing is the question of the relationship between the results of the "teething" indicator and the dynamics of the somatometric parameters of the physical development of children and adolescents in the Volgograd oblast. We conducted a comparative analysis of the intensity and timing of the permanent teeth eruption in Volgograd schoolchildren with dynamic characteristics of height and body weight.

It was indicated that the first growth jump in boys took place at 10 years (+7.0 cm). The age of pubertal growth jump was at 13-14 years (+7.0). The assessment of the corresponding indicator in girls showed that the first growth jump was also at 10 years (+7.9 cm), the second - at 12 years (+8.5 cm). Analysis of the indicator "body weight" revealed the fact of a sharp increase in the indicator "body weight" in boys from the age of 12 and older: the difference between 11-year-old and 12-year-old boys is almost 8 kg. Girls have a sharp increase in body weight from the age of 13.

A comparative analysis of the dynamics of changes in mass-growth parameters and their comparison with the permanent teeth eruption data in schoolchildren showed that these processes are multidirectional. It WAS revealed that the second stage of the most significant increase in the number of permanent teeth corresponds to the age of

11 years in Volgograd boys and girls, i.e. a year later in comparison with growth jumps (Fig. 1) and falls on the age period between two growth jumps. The inverse relationship was determined in comparison the "dental age" with the weight gain indicators in Volgograd schoolchildren (Fig. 2). Thus, the greatest increase in the "body mass" indicator is 12 years for boys and 13 years for girls, which is 1-2 years later than the "jump" for the permanent teeth eruption (Fig. 2).

According to the results of the Linear pairwise correlation analysis (the Pearson correlation coefficient was determined using MS Excel), a close positive relationship was indicated between the timing and intensity of the permanent teeth eruption and changes in height and body weight. Correlation coefficients, respectively, were 0,95 and 0,92 for boys, and 0,97 and 0,95 for girls. This confirms the fact of a close biological connection in children of this age group (7-17 years old) between mass and growth changes and changes in the dental system. At the same time, children with low and below average somatometric parameters are more likely to have late teething, which coincides with the data of Zolotareva L.A. [6].

The comparative analysis of the period of "rest" among adolescents living in different regions of the country is worth studying. The data of V.A. Petrov [7] (Pri-

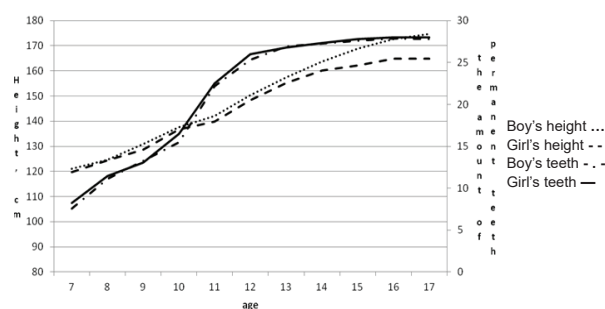


Fig. 1. Dynamic characteristics of indicators of body height and "dental age" in children of Volgograd

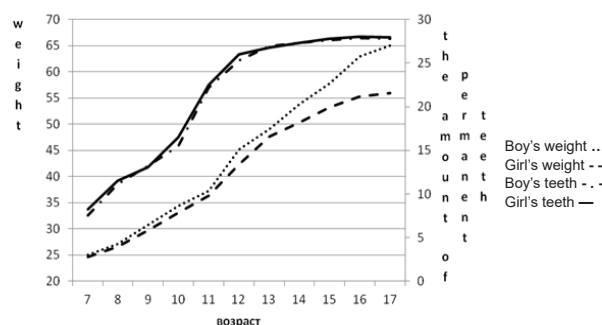


Fig. 2 Dynamic characteristics of indicators of body mass and "dental age" in children of Volgograd.

morsky Krai) and S.Yu. Kasyugi et al. [7] (Nizhny Novgorod) indicate the onset of the second period of "rest" in girls from the age of 13, in boys - from the age of 14. According to our data, the second "rest period" in Volgograd boys and girls begins at the age of 12 (the least statistically significant increase). It was also found that in the Volgograd oblast, the period of the most intense dentition occurs in boys and girls at 11 years old (in Primorsky Krai, it begins at 10 years in both boys and girls, in the Nizhny Novgorod oblast: in boys at 11 12 years old, in girls 10-11 years old). It is possible that the revealed differences are due to climate, nutritional, ethnic, and ecological peculiarities of living, which requires further scientific study and confirmation [6].

Comparative data on the number of permanent teeth in different regions (M±δ)

Age	Nizhny Novgorod		Primorsky Krai		Volgograd oblast	
	boys	girls	boys	girls	boys	girls
6	-	-	-	-	2.62±2.19	3.06±2.29
7	7.7±2.6	8.5±2.6	7±3	9±3	7.53±2.94	8.21±3.22
8	10.6±1.8	11.4±2.4	12±2	12±3	11.12±2.09	11.48±1.98
9	12.9±2.6	13.8±3.1	14±2	15±3	13.24±2.54	13.07±2.22
10	14.6±3.9	16.8±4.4	18±3	19±3	15.49±3.19	16.47±4.39
11	18.8±5.2	20.0±4.7	20±4	21±3	22.15±4.29	22.48±4.08
12	23.5±4.1	24.5±3.8	24±3	25±2	25.29±3.11	25.97±2.36
13	25.6±3.2	26.7±2.0	27±1	28	26.90±1.65	26.78±1.64
14	27.3±1.4	27.5±1.2	28	28	27.29±1.69	27.35±1.25
15	27.6±0.8	27.7±0.9	28	28	27.62±1.15	27.83±0.63
16	-	±	28	28	27.84±0.72	28±0.00
17	-	±	28	28	27.82±1.16	27.97±0.30

Conclusions:

1. It is necessary to include standards for the permanent teeth eruption in regional standards for the physical development of children and adolescents. During preventive medical examinations of minors, it is necessary to indicate not only the sexual development formula of the child, but also the terms of the permanent teeth eruption.

2. According to the teething indicators in different regions of the country, differing in climatic-geographical, socio-economic, ethnic and ecological characteristics, it is necessary to develop standards and further studying the characteristics

of the eruption process for each region in Russia.

References

1. Харитонов В.М., Ожигова А.П., Година Е.З. Антропология: учеб. для студ. высш. учеб. заведений / М.: Гуманит. изд. центр ВЛАДОС. 2004; 272. [Haritonov VM, Ozhigova AP, Godina EZ. Anthropology: textbook for higher institutions stud. M.: Gumanit. izd. centr VLADOS. 2004; 272. (In Russ.).]
2. Богомолова Е.С. Гигиеническое обоснование мониторинга роста и развития школьников в системе «здоровье-среда обитания»: автореф. дис. ... докт.мед.наук, Нижний Новгород, 2010; 23. [Bogomolova ES. Hygienic justification for monitoring the growth and development of schoolchildren in the "health-environment": avtoref. dis. ... dokt.med.nauk. Nizhnij Novgorod. 2010; 23. (In Russ.).]
3. Волкова С.И., Греченко Я.В. Особенно-

5. Година Е.З. Секулярный тренд и региональные особенности его протекания: зачем нужны локальные стандарты. Актуальные проблемы здоровья детей и подростков и пути их решения: материалы 3-го Всероссийского конгресса с межд. участием по школьной и университетской медицине. М. 2012; 42. [Godina E.Z. Secular trend and regional features of its course: why do we need local standards. Actual problems of the health of children and adolescents and ways to solve them: materials of the 3rd All-Russian Congress with int. participation in school and university medicine. M., 2012: 42. (In Russ.).]

6. Золотарева Л.А. Влияние регионально-этнических факторов на сроки прорезывания постоянных зубов у детей Удмуртии: дис. ... канд.мед.наук. Москва. 2004; 126. [Zolotareva LA. The influence of regional and ethnic factors on the timing of teething of permanent teeth in children of Udmurtia: dis. ... kand.med.nauk. Moskva, 2004; 126. (In Russ.).]

7. Косюга С.Ю., Богомолова Е.С., Киселева О.С. и др. Стоматологические критерии оценки биологического возраста детей и подростков. Стоматология. 2013; 92(6): 56-58. [Kosyuga SYu, Bogomolova ES, Kiseleva OS. Dental criteria for assessing the biological age of children and adolescents. Stomatologiya. 2013; 92(6): 56-58. (In Russ.).]

8. Кучма В.Р., Скоблина Н.А., Бокарева и др. Оценка физического развития детей и подростков в образовательных организациях. М. Научный центр здоровья детей РАМН, 2014; 38. [Kuchma VR, Skoblina NA, Bokareva NA i dr. Assessment of the physical development of children and adolescents in educational institutions. V.R. Kuchma, - M.: Izd-vo. Nauchnyj centr zdorov'ya detej RAMN. 2014; 38. (In Russ.).]

9. Петров В.А. Методы определения и оценки состояния здоровья и физического развития детей и подростков: учебное пособие. Владивосток. Медицина ДВ. 2014; 168. [Petrov VA. Methods for determining and assessing the state of health and physical development of children and adolescents: a training manual. Vladivostok. Medicina DV. 2014; 168. (In Russ.).]

10. Пивоваров Ю.П., Королик В.В. Руководство к лабораторным занятиям по гигиене и основам экологии человека. М. Академия. 2006; 512. [Pivovarov YuP, Korolik VV. Guide to laboratory classes on hygiene and the basics of human ecology. M. Akademiya. 2006; 512. (In Russ.).]

11. Полосухина Е.И. Индивидуально-типологическая изменчивость прорезывания постоянных зубов в связи с цефало и соматотипами: клинко-анатомическое исследование: автореф. дис. ... канд.мед.наук. Волгоград. 2007; 22. [Polosuhina EI. Individual-typological variability of teething of permanent teeth in connection with cephalo and somatotypes: clinical anatomical study: author. dis. ... Candidate of Medical Science. Volgograd. 2007; 22.]

12. Баранов А.А., Кучма В.Р., Скоблина Н.А. Физическое развитие детей и подростков на рубеже тысячелетий. М. Научный центр здоровья детей РАМН. 2008; 216. [Baranov AA, Kuchma VR, Skoblina NA. The physical development of children and adolescents at the turn of the millennium. M. Nauchnyj centr zdorov'ya detej RAMN. 2008; 216. (In Russ.).]

сти формирования зубной системы у детей и подростков г. Сергача Нижегородской области как один из показателей их биологического созревания. Молодой ученый. 2016; 3: 359-361. [Volkova SI, Gretchenko YaV. Features of the formation of the dental system in children and adolescents of the city of Sergach, Nizhny Novgorod region as one of the indicators of their biological maturation. Molodoy uchenyj. 2016; 3: 359-361 (In Russ.).]

4. Гаврюшин М.Ю., Березин И.И., Сазонова О.В. Антропометрические особенности физического развития школьников современного мегаполиса. Казанский медицинский журнал. 2016; 4: 629-633. DOI 10.17750/KMol 2015-629. [Gavryushin MYu, Berezin II, Sazonova OV. Anthropometric features of the physical development of schoolchildren in a modern metropolis. Kazanskij medicinskij zhurnal. 2016; 4: 629-633. (In Russ.).]