

колового, підборідного та грудино-ключично-сосцеподібного м'язів у 30 пацієнтів віком 20-28 років без соматичної патології, морфологічних, функціональних та естетичних порушень зубо-щелепної ділянки. Результати дослідження доводять участь мимічних м'язів та м'язів шиї у стисканні зубів, рухах нижньої щелепи та ковтанні, що вказує на функціональну єдність нейромускулярної складової стоматогнатичної системи. Це обумовлює необхідність вивчення роботи цих м'язів у осіб із порушенням функцій зубощелепної ділянки, особливо тих, що пов'язані із рухами нижньої щелепи та язика на всіх етапах ортодонтичного лікування.

Ключові слова: зубощелепова ділянка, електроміографія, м'язи краніо-мандибулярної системи, функції зубощелепної ділянки.

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жевательной, круговой, подбородочной и грудино-ключично-сосцевидной мышц у 30 пациентов 20-28 лет без соматической патологии, морфологических, функциональных и эстетических нарушений зубочелюстной области. Результаты исследования доказывают участие мимических мышц и мышц шеи в сжатии зубов, движениях нижней челюсти и глотании, что указывает на функциональное единство нейромускулярной составляющей стоматогнатической системы. Это обуславливает необходимость изучения работы этих мышц у лиц с нарушением функций зубочелюстной области, особенно тех, которые связаны с движениями нижней челюсти и языка на всех этапах ортодонтического лечения.

Ключевые слова: зубочелюстная область, электромиография, мышцы кранио-мандибулярной системы, функции зубочелюстной области./

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L.V. Smaglyuk, N.L. Chukhray¹, E.V. Bezvushko¹, A.L. Miskiv¹, O.O. Shpotyuk¹
Ukrainian Medical Stomatological Academy, ¹Danylo Halytsky Lviv National Medical University

THE RELATIONSHIP OF MALOCCLUSIONS WITH THE ERUPTION TIME OF PERMANENT TEETH IN CHILDREN LIVING IN DIFFERENT CLIMATIC AND GEOGRAPHICAL CONDITIONS

e-mail: anvitatali@gmail.com

The article highlights the prevalence and structure of malocclusion and terms of eruption of the permanent teeth in children living in different climatic and geographical conditions. It has been established that the prevalence of malocclusion and terms of eruption of the permanent teeth in children depends on the geographical and environmental living conditions. It is proved that there is a strong correlation between malocclusions and the number of erupted teeth.

Key words: malocclusions, permanent tooth eruption, climatic and geographical conditions.

The work is a fragment of the research project "Assessment of dental morbidity of children with regard to environmental and social aspects and the effectiveness of prevention of dental caries and periodontal diseases", state registration No. 0115U000037.

Dentofacial anomalies, with an average prevalence of 40% to 81%, are among the major dental diseases [3, 8]. The analysis of the literature data shows that there has not been a tendency to a downward trend in this pathology in recent years. Significant increase of dentofacial anomalies, along with other factors, is associated with the negative environmental impact, the presence of somatic diseases, and climatic and geographical living conditions of children [2, 5, 6]. Therefore, the prevalence of dentofacial anomalies can be fully considered as one of the indicators that characterize the health status of children in a particular region.

In addition, it is known that the formation of dentofacial anomalies is significantly affected by the eruption time of permanent teeth, which is an important criterion for indicators of normal development of the dentofacial system. Deviations from the average terms of eruption of permanent teeth serve as one of the prognostic symptoms of the development of the child's organism [4, 7].

Different internal and external factors cause the fluctuations in the time of permanent teeth eruption. Climatic, geographical, ecological, and regional peculiarities of the territory where children live have a significant impact on the term of permanent teeth eruption [1, 8]. In this regard, it is important to study the features of permanent teeth eruption for each individual region, which differ in their conditions and their relationship with the formation of dentofacial anomalies. Epidemiological studies have been devoted to evaluating the eruption time of permanent teeth in Ukraine [8]. In recent years, the issue of terms of permanent teeth eruption, the dynamics of their changes, the regional features of teeth eruption, their relationship with the physical development of children and with dentofacial anomalies have not been covered in the literature, which, in turn, causes difficulties in the choice of treatment and preventive measures. Therefore, it is important to further study the prevalence of dentofacial anomalies, to evaluate the eruption time of permanent teeth at the regional level and to assess their interconnection.

The purpose of the work was to assess the relationship between malocclusions and the eruption time of permanent teeth in children living in different climatic and geographical conditions.

Material and research methods. The total of 333 7-year-old children were examined to assess the prevalence and structure of malocclusions and the eruption time of permanent teeth. Among them, there are 110 children living in the flat terrain, 109 children living in the mountainous terrain and 114 children from the foothills. The nature of dentofacial anomalies was evaluated according to the D.A. Kalvelis classification.

Statistical processing of the research results was carried out using software packages for statistical analysis of Microsoft Excel research data, which is included in the Microsoft Office package and the Statistica program. When performing the statistical processing of the obtained data, the following methods were used: analysis of variational series – since there was Gaussian distribution in the studied groups, the obtained results are presented in the form of arithmetic mean values and their average error ($M \pm m$); assessing the estimated probability of differences in the obtained results in the compared groups using the Student t-test; correlation analysis was performed by calculating the paired and linear correlation coefficients using the Pearson method. The difference at $p < 0.05$ was considered significant.

The purpose of statistical data processing was to determine the characteristic quantitative estimates of the studied indicators, to establish the presence or absence of correlation between the obtained indicators, as well as the influence of external factors on them. Correlation analysis was performed between the incidence of malocclusions and the number of erupted permanent teeth.

During the examination all safety measures concerning the children's health, respect for their rights, human dignity and moral and ethical standards were kept in accordance with the principles of the Helsinki Declaration, the Council of Europe Convention on Human Rights and Biomedicine and the relevant laws of Ukraine.

The results of the study and their discussion. The prevalence, structure of malocclusions and permanent teeth eruption in 7-year-old children are shown in table 1. It was found that with the prevalence of deep ($40.91 \pm 4.69\%$) and distal occlusion ($38.18 \pm 4.63\%$) in children living in the flat territory, only 4.2 and 4.0 teeth were erupted in the upper jaw, respectively, which is significantly less than in children who had malocclusions much less frequently. The largest number of permanent teeth that erupted in the upper jaw in the children living in the flat territory was found in case of the cross bite (5.8 teeth), and the highest number of permanent teeth that erupted in the children in the lower jaw (6.8 teeth) was observed in case of the open bite. Children living in the mountainous area also the most frequently had distal ($28.44 \pm 4.32\%$) and deep ($16.51 \pm 3.56\%$) malocclusions, in which the number of teeth that erupted in both jaws was 10.6 teeth and 10.9 teeth, respectively.

Analyzing the foothills, on average, we see an increase by one tooth in the number of erupted teeth, and a decrease in the incidence of malocclusions.

Table 1

The prevalence of malocclusions and the number of permanent teeth that erupted in children depending on the area of residence

Children (7-year-old)		Malocclusions									
		Distal Bite		Mesial Bite		Deep Bite		Open Bite		Cross Bite	
		the amount of teeth	%	the amount of teeth	%	the amount of teeth	%	the amount of teeth	%	the amount of teeth	%
Flat Terrain	Upper Jaw	4.0	38.18 ± 4.63	5.1	2.73 ± 1.55	4.2	40.91 ± 4.69	5.4	4.55 ± 1.99	5.8	7.27 ± 2.48
	Lower Jaw	6.2		6.6		6.1		6.8		6.5	
Mountainous Terrain	Upper Jaw	4.2	28.44 ± 4.32	4.6	5.50 ± 2.18	4.4	16.51 ± 3.56	4.8	9.17 ± 2.76	4.6	12.84 ± 3.20
	Lower Jaw	6.4		6.7		6.5		6.6		6.8	
Foothills	Upper Jaw	4.3	11.40 ± 2.98	4.7	7.02 ± 2.39	4.8	12.28 ± 3.07	5.4	4.39 ± 1.92	5.8	6.14 ± 2.25
	Lower Jaw	6.9		6,7		6,1		6,6		6,7	

It was found that in 7-year-old children (table 2) living in the mountainous area there is a statistically significant ($p < 0.05$) inverse correlation between the proportion of permanent teeth in the upper jaw and the prevalence of distal ($r = -0.87$), mesial ($r = -0.78$), deep ($r = -0.79$), and cross ($r = -0.53$) bites.

A similar significant ($p < 0.05$) relationship was found between the proportion of permanent teeth and the prevalence of distal ($r = -0.68$), mesial ($r = -0.60$), and open ($r = -0.75$) bites in the lower jaw. This means that the higher the prevalence of these types of malocclusions is, the less is the number of permanent teeth that erupted in 7-year-old children living in the mountainous area.

Table 2

Correlation between different malocclusions and the number of permanent teeth that erupted depending on the area of residence of 7-year-old children

Children (7-year-old)		Malocclusions				
		Distal Bite	Mesial Bite	Deep Bite	Open Bite	Cross Bite
Mountainous Terrain	Upper Jaw	-0.87*	-0.78*	-0.79*	-0.46	-0.53*
	Lower Jaw	-0.68*	-0.60*	-0.35	-0.75*	-0.49
Foothills	Upper Jaw	-0.42	-0.63*	-0.47	-0.32	-0.55*
	Lower Jaw	-0.25	-0.31	-0.49	-0.21	-0.24
Flat Terrain	Upper Jaw	-0.45	-0.56*	-0.41	-0.62*	-0.68*
	Lower Jaw	-0.42	-0.44	-0.51*	-0.50*	-0.34
Average	Upper Jaw	-0.61*	-0.70*	-0.52*	-0.45	-0.57*
	Lower Jaw	-0.52*	-0.42	-0.48*	-0.59*	-0.44

Note. * – the correlation coefficient is significant ($p < 0.05$)

In children living in the foothills, a similar significant ($p < 0.05$) inverse correlation was found between the proportion of permanent teeth in the upper jaw and the prevalence of mesial ($r = -0.63$) bite.

Significant inverse correlations were found between the proportion of permanent teeth in the upper jaw and the prevalence of mesial ($r = -0.56$), open ($r = -0.62$) and cross ($r = -0.68$) bites in children living in the flat territory. In the lower jaw, a similar relationship was established with the prevalence of deep ($r = -0.51$) and open ($r = -0.50$) bites. We analysed the relationship between the incidence of malocclusion and the eruption of permanent teeth in children, taking into account the article (table 3). The results of the analysis indicate that the higher the incidence of malocclusions is, the smaller is the number of permanent teeth that erupted.

Table 3

Correlation between different malocclusions and the number of permanent teeth that erupted depending on the area of residence of boys

Boys (7-year-old)		Malocclusions				
		Distal Bite	Mesial Bite	Deep Bite	Open Bite	Cross Bite
Flat Terrain	Upper Jaw	-0.50	-0.47	-0.62*	-0.43	-0.69*
	Lower Jaw	-0.39	-0.58	-0.27	-0.54	-0.47
Mountainous Terrain	Upper Jaw	-0.89*	-0.76*	-0.83*	-0.79*	-0.61
	Lower Jaw	-0.67*	-0.43	-0.39	-0.77*	-0.44
Foothills	Upper Jaw	-0.34	-0.81*	-0.62*	-0.46	-0.57
	Lower Jaw	-0.46	-0.21	-0.54	-0.37	-0.28

Note. * – the correlation coefficient is significant ($p < 0.05$)

Therefore, significant ($p < 0.05$) inverse correlations between the proportion of permanent teeth in the upper jaw and the prevalence of deep ($r = -0.62$) and cross ($r = -0.69$) bites were found in boys living in a flat terrain. In boys living in the mountainous area, there is a significant ($p < 0.05$) inverse correlation between the proportion of permanent teeth in the upper jaw and the prevalence of distal ($r = -0.89$), mesial ($r = -0.76$), deep ($r = -0.83$) and open ($r = -0.79$) bites. A similar significant ($p < 0.05$) relationship was found between the proportion of permanent teeth and the prevalence of distal ($r = -0.67$) and open ($r = -0.77$) bites in the lower jaw. In boys living in the foothills, a significant ($p < 0.05$) inverse correlation was found between the proportion of permanent teeth in the upper jaw and the prevalence of mesial ($r = -0.81$) and deep ($r = -0.62$) bites.

It was found that with the increase in the incidence of malocclusions, a decrease in the number of permanent erupted teeth is observed (table 4). Therefore, significant ($p < 0.05$) inverse correlations between the proportion of permanent teeth in the upper jaw and the prevalence of mesial ($r = -0.55$) and open ($r = -0.63$) bites were found in girls living in a flat terrain. A similar significant ($p < 0.05$) relationship was found between the proportion of permanent teeth and the prevalence of distal ($r = -0.78$) and deep ($r = -0.55$) bites in the lower jaw.

Correlation between different malocclusions and the number of permanent teeth that erupted depending on the area of residence of girls.

Girls (7-year-old)		Malocclusions				
		Distal Bite	Mesial Bite	Deep Bite	Open Bite	Cross Bite
Flat Terrain	Upper Jaw	-0.46	-0.55*	-0.40	-0.63*	-0.50
	Lower Jaw	-0.78*	-0.43	-0.55*	-0.51	-0.36
Mountainous Terrain	Upper Jaw	-0.88*	-0.83*	-0.43	-0.32	-0.51
	Lower Jaw	-0.65*	-0.84*	-0.41	-0.53	-0.47
Foothills	Upper Jaw	-0.43	-0.54*	-0.31	-0.29	-0.54*
	Lower Jaw	-0.17	-0.38	-0.41	-0.07	-0.22

Note. * – the correlation coefficient is significant ($p < 0.05$)

For girls living in the mountainous areas, there is a significant ($p < 0.05$) inverse correlation between the proportion of permanent teeth in the upper and lower jaws and the prevalence of distal ($r = -0.88$ in the upper and -0.65 in the lower) and mesial bites ($r = -0.83$ and -0.84 , respectively).

In girls living in the foothills, a similar significant ($p < 0.05$) inverse correlation was found between the proportion of permanent teeth in the upper jaw and the prevalence of mesial ($r = -0.54$) and cross ($r = -0.54$) bites. The prevalence of dental jaw abnormalities occupies an important place among the main dental diseases [1, 4, 7]. Several authors link the significant increase of dental jaw abnormalities with the negative impact of the environment, the presence of somatic, climatic and geographical living conditions of children [1, 3, 7]. The prevalence of dental jaw abnormalities can be considered as one of the indicators characterizing the health of children in a particular region [5, 8].

The article highlights the prevalence and structure of malocclusion and terms of eruption of the permanent teeth in children living in different climatic and geographical conditions. It has been established that the prevalence of malocclusion and terms of eruption of the permanent teeth in children depends on the geographical and environmental living conditions [3, 5]. It is proved that there is a strong correlation between malocclusions and the number of erupted teeth.

It was estimated that in the case of frequency of deep bite ($40.91 \pm 4.69\%$) and distal occlusion ($38.18 \pm 4.63\%$) in children living in flat terrain region there were revealed only 4.2 and 4.0 erupted teeth, which is less comparing with children with decreased index of malocclusions frequency. The most high number of the permanent teeth, which are erupted on the upper jaw is revealed in the case of crossbite (5, 8 tooth). in the case of open bite it was noticed the most high number of the permanent teeth that were erupted on the lower jaw (6, 8 tooth).

In children that live in the mountainous terrain the most frequent were diagnosed distal occlusion ($28.44 \pm 4.32\%$) and deep bite ($16.51 \pm 3.56\%$). In that cases number erupted teeth on the both jaws was 10, 6 tooth and 10, 9 tooth.

Conclusion

The examination of children revealed that distal and deep bites were more frequently diagnosed in children living in the flat territory compared with the mountainous area and foothills. It was proved that there is a strong correlation between the number of teeth that erupted in children during the period of an early transitional bite and malocclusions. A relationship between the incidence of malocclusions and the eruption time of permanent teeth was found, taking into account the peculiarities of the residence area.

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Реферати

**ЗВ'ЯЗОК АНОМАЛІЙ ПРИКУСУ І ТЕРМІНІВ
ПРОРІЗУВАННЯ ЗУБІВ У ДІТЕЙ З РІЗНИХ
КЛІМАТО-ГЕОГРАФІЧНИХ УМОВ**

Смаглюк Л.В., Чухрай Н.Л., Безвушко Е.В.,
Миськів А.Л., Шпотюк О.О.

У статті висвітлено поширеність та структуру аномалій прикусу та терміни прорізування постійних зубів у дітей, які проживають у різних клімато-географічних умовах. Встановлено, що поширеність аномалій прикусу та прорізування постійних зубів у дітей залежать від географічних та екологічних умов проживання. Доведено, що між аномаліями прикусу та кількістю зубів, що прорізулися існує сильний кореляційний зв'язок.

Ключові слова: аномалії прикусу, прорізування постійних зубів, клімато-географічні умови.

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**СВЯЗЬ АНОМАЛІЙ ПРИКУСА І СРОКОВ
ПРОРЕЗЬВАННЯ ЗУБОВ У ДЕТЕЙ С РАЗНЫХ
КЛИМАТО-ГЕОГРАФИЧЕСКИХ УСЛОВИЙ**

Смаглюк Л.В., Чухрай Н.Л., Безвушко Е.В.,
Миськів А.Л., Шпотюк О.О.

В статье освещены распространенность и структуру аномалий прикуса и сроки прорезывания постоянных зубов у детей, проживающих в различных климато-географических условиях. Установлено, что распространенность аномалий прикуса и прорезывания постоянных зубов у детей зависят от географических и экологических условий проживания. Доказано, что между аномалиями прикуса и количеством зубов прорезались существует сильная корреляционная связь.

Ключевые слова: аномалии прикуса, прорезывание постоянных зубов, климато-географические условия.

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O.A. Sogokon, O.V. Donets, I.M. Donets¹
Poltava V.G. Korolenko National Pedagogical University, Poltava
¹Ukrainian Medical Stomatological Academy, Poltava

**FUNCTIONAL STATE OF CARDIOVASCULAR AND DIGESTIVE SYSTEMS
IN THE BODY OF STUDENTS DURING FITNESS TRAINING**

e-mail: elena.sogokon@gmail.com

Examination of students engaged in modern fitness technologies is performed in the work and it is established that physical exercises effect the activation of internal systems' work in the body. Analyzing the correlation of recreative fitness with students' nutrition provides an opportunity to identify prospects for improving cardiovascular and digestive systems, improving general condition and achieving the desired student athletic performance. The study found that 92.5% of students were positive about the new content of training in modern fitness technology and only 7.5% said their attitude was uncertain. During the experiment, the dynamics of changes in the parameters of the cardiovascular and digestive systems' functional state (experimental/control groups) were confirmed: the mean body weight decreased by 2.8 kg/1.5 kg, the pulse at rest decreased to 65.25 beats./min.±0.25/74.46 bpm±0.64; systolic diastolic 112.75 mm Hg±0.35/118.21 mm Hg±0.79; diastolic pressure decreased to 72.21 mm Hg±0.39/76.57 mm Hg±0.43; the volume of the lungs increased by 0.4 l/0.2 l, which is evidence of the cardiovascular system's economic activity and confirms the feasibility of the applied methodology of health fitness technologies. Regarding the expediency of dietary change: 77% of students said they needed change, while 21% said they wanted it, and only 2% said they didn't want to change their diet.

Key words: fitness technology, nutrition, physical education, health, cardiovascular and respiratory systems.

The work is a fragment of the research project "Implementation of health-saving technologies in physical education in the context of European integration of Ukraine", state registration No. 0117U 003236.

Modern fitness technology is an aspect of the fitness industry that is related to organizational and methodological support of the process aimed at improving the physical condition of the person. High fitness competitive advantage in comparison with other industries, which provide the sphere of human leisure, causes its rapid development, provides a meaningful filling of fitness technologies and determines their efficiency. The purpose of this study is to systematize organizational forms of work, to analyze the structure and methodological features of the tools, to identify the dynamics of changes in the parameters of the physical state, nutrition recommendations that are used in training of modern fitness technologies. Our study was performed based on the research and methodological literature, pedagogical observations of the course of work at the best fitness clubs in Poltava, analysis of health fitness at the Faculty of Physical Education at the Poltava V.G. Korolenko National Pedagogical University, and studies of physical education classes while training the module "Recreative Gymnastics".

The fitness industry is characterized by a high degree of innovation. Specialists identify a variety of activities that can meet the broadest segments of the population. Despite their different directivity profiles, their belonging is determined by a common goal, which is to promote overall health of the body, the achievement of which is conditioned by the principles of health nutrition [1, 4, 7]. All the accumulated knowledge regarding the organizational and methodological support of fitness requires systematization for