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T. P. Pozur, M. M. Shinkaruk-Dykovytska, A. O. Gavryluk, V. O. Gnenna, I. K. Shcherba, V. V. Yasko, O. M. Yakubovska
National Pirogov Memorial Medical University, Vinnytsya

COMPUTER-TOMOGRAPHIC MESIODISTAL DIMENSIONS OF TEETH IN BOYS AND GIRLS WITH PHYSIOLOGICAL BITE DEPENDING ON FACE TYPES

E-mail: m.dykovytska@gmail.com

The purpose of the work is to establish the boundaries of the percentile scope and the peculiarities of the computer-tomographic mesiodistal dimensions of the upper and lower jaw teeth in boys and girls with physiological bite, depending on the type of person. Primary computer-tomographic dimensions of the width of the crowns of the teeth and the width of the teeth at the level of the anatomical neck in the mesiodistal direction with normal occlusion close to the orthognathic bite and the cephalometric parameters of 44 boys and 50 girls of the Podillia region of Ukraine were obtained from the data bank of the research center of the National Pirogov Memorial Medical University, Vinnytsya. Face type was determined using the Garson morphological index. The statistical processing of the obtained results was carried out using the statistical software package "Statistica 6.0" using non-parametric estimation methods. In boys and girls with normal occlusion close to orthognathic bite with different types of face the boundaries of the percentile width of the crowns and teeth widths at the level of the anatomical neck in the mesiodistal direction are determined. It has been established that in young men with wide faces, practically all dimensions of the width of the crowns of the teeth in the mesiodistal direction (with the exception of the lower second premolars) are significantly higher or tend to be higher than that of girls with a wide face; as well as in broad-faced boys, most of the size of the teeth width at the anatomical neck level in the mesiodistal direction (with the exception of the lower central and lateral incisors) is significantly higher than that of girls with a broad face. When comparing discrepancies between the computer tomographic size of the teeth crowns and teeth widths at the anatomical neck level in the mesiodistal direction between girls with a broad and very wide face, only a significantly higher value of the width of the upper central incisors at the level of the anatomical neck in girls with very wide faces was established.

Keywords: boys, girls, face type, computer tomography, mesiodistal dimensions of teeth, physiological bite, sexual differences.

It can be stated that at present, dental diagnostic and treatment methods have increasingly anthropological approach [3, 7, 12, 14, 15]. That is, an individual approach to the treatment of a patient with dental disease is becoming more and more widespread. However, it should be noted that it is impossible to fully use this approach without a base, which should include a norm that applies not only to the size and position of the teeth relative to one another, but also depending on the cephalometric indices, the ethnic or regional identity of the person or its sex [9, 21, 13]. At present, special importance in aesthetic dentistry is given to the search for features of the size of the teeth on the face type [16, 5, 19, 21]. If work on the study of the relationship between the indicators of the teeth and the form of the head are systemic [4, 6, 8, 9, 10, 13], the work of studying the relationship of teeth with the face type is not numerous [16, 19, 21]. Among the works of foreign researchers in recent years, it is possible to note studies that study the relationship between the type of person and the size of the canines, incisors in persons with physiological bite, or study the ratio of parameters of the upper jaw to the sagittal facial profile [19, 21]. Pedrosa V. O. et al. [20] revealed significant interconnections between the investigated indicators (Bowker's test, $p = 0.0015$). Work is being done, in particular by scientists from Nepal and Saudi Arabia, in order to establish similar connections for the local population [18, 22]. That is, thus, the resources for the creation of normative bases of their own countries are formed. Taking into account this, the research aimed at determining the size of teeth in persons with physiological bite, depending on the type of person, is a necessary step that needs to be overcome in order to create a comprehensive system for providing dental care to the population.

The **purpose** of the study is to determine the limits of the percentile dimension and the peculiarities of the computer-tomographic mesiodistal dimensions of the upper and lower jaw teeth in boys and girls with physiological bite, depending on the type of person.

Materials and methods. Primary computer-tomographic indexes of teeth size and cephalometric parameters of 44 boys and 50 girls of the Podillia region of Ukraine with normal occlusion close to orthognathic bite (determined by 11 points by M. G. Bushan et al. [2]) obtained from the data bank of the scientific Research Center of National Pirogov Memorial Medical University, Vinnytsya.

For this study, a dental cone-ray tomograph was used - Veraviewepocs 3D, Moret (Japan). The research was conducted according to the scheme developed by Gunas I.V., Dmitriev N.A. and Marchenko A.V. [17] within these characteristics. The volume of the three-dimensional image is an 8x8cm cylinder, a layer thickness of 0,2/0,125 mm, an irradiation dose of 11-48 μSv, a voltage and a current of 60-90kV/2-10mA. Measuring the width of the crowns of teeth (VSHIR) and the width of the teeth at the level of the

anatomical cervix (MDDEG) in the mesio-distal direction was performed in the i-Dixel One Volume Viewer [Ver.1.5.0] J Morita Mfg. Cor. Since in the performed studies, when comparing the computer-tomographic metric characteristics of the same names of the right and left sides, there were no significant differences or trends, [17] we in the subsequent studies use the mean values of the corresponding teeth on the upper (marking 1) and the lower (designation 4) jaws. Thus, in our study: 11 or 41 - upper or lower central incisors, 12 or 42 - upper or lower lateral incisors, 13 or 43 - upper or lower canines, 14 or 44 - upper or lower first premolars, 15 or 45 - upper or lower second premolars, 16 or 46 - upper or lower first molars.

Table 1

Percentile width of the crowns of teeth (VSHIR_) of the upper and lower jaw in the mesiodistal direction in boys and girls with different face types (mm)

Indexes	Boys		Girls			
	wide face		very wide face		wide face	
	25,0th percentl	75,0th percentl	25,0th percentl	75,0th percentl	25,0th percentl	75,0th percentl
VSHIR_11	8,6	9,2	8,3	8,8	8,0	8,7
VSHIR_12	6,7	7,1	6,3	6,8	6,0	6,9
VSHIR_13	7,8	8,4	7,3	7,9	7,2	7,9
VSHIR_14	7,0	7,4	6,5	7,2	6,3	7,1
VSHIR_15	6,6	6,9	6,1	6,7	6,1	6,9
VSHIR_16	10,3	10,6	10,0	10,6	10,0	10,5
VSHIR_41	5,0	5,6	4,9	5,2	4,8	5,2
VSHIR_42	5,6	5,9	5,3	5,8	5,2	5,8
VSHIR_43	6,3	7,0	6,0	6,8	6,0	6,6
VSHIR_44	7,1	7,4	6,8	7,3	6,5	7,2
VSHIR_45	6,9	7,5	6,7	7,2	6,9	7,5
VSHIR_46	10,8	11,1	10,4	11,0	10,1	10,8

Measurements of cephalometric sizes were carried out with a soft centimeter ribbon and a large compass with a scale in the real size of the Martin system [1]. The face type was determined using the Garson morphological index - the ratio of the morphological face length (direct distance from nasion to gnation) to the face width in the region of the cheek arches [11]. Up to a value of 78,9 young boys and girls were assigned to a group with a very broad face; 79,0-83,9 - wide face; 84,0-87,9 - middle face; 88,0-92,9 - narrow face; 93,0 and more - very narrow face. The following distribution is established: boys with very wide faces - 6, boys with wide faces - 25, boys with middle faces - 6, boys with narrow faces - 6, boys with very narrow faces - 1; girls with a very wide face - 21, girls with a wide face - 20, girls with a middle face - 6, girls with a narrow face - 6, boys with a very narrow face - 0. Therefore, for further studies of boys and girls with different facial types we investigated only boys and girls with wide faces and girls with a very wide face.

The statistical processing of the obtained results was carried out using the statistical software package "Statistica 6.0" using non-parametric estimation methods.

Results of the study and their discussion. In boys and girls with normal occlusion bite close to orthognathic occlusion with different types of face on the upper and lower jaws, boundaries of percentile size (correspondingly 25,0 percentl and 75,0 percentl) of teeth crowns and teeth widths at the level of the anatomical neck in mesiodistal direction are determined (Table 1, 2).

It should be noted that the results of the width of the crowns of teeth, in most cases, are somewhat higher than the results obtained from boys and girls of Podillia with the corresponding type of face, obtained on gypsum models [5], which is most likely related to the measurement methodology. In the analysis of sexual differences of morphometric computer-tomographic dimensions of the width of teeth crowns and teeth widths at the level of the anatomical neck in the mesiodistal direction between boys and girls with a broad face (Table 3), it was found that practically all sizes of the crowns of the teeth in the mesiodistal direction (for except for the lower second premolars) in boys with a broad face are significantly higher ($p < 0,05$-$0,001$) or tended to higher values ($p = 0,066$) than in girls with a wide face; the majority of the size of the teeth width at the level of the anatomical neck in the mesiodistal direction (with the exception of the lower central and lateral incisors) in boys with a broad face is also significantly higher ($p < 0,05$-$0,001$) than in girls with a broad face.

In the analysis of differences between morphometric computer tomography dimensions of the width of teeth crowns and teeth width at the level of the anatomical neck in the mesiodistal direction between girls with a broad and very wide face (see Table 3), only a significant ($p < 0.05$) greater value the width of the upper central incisors at the level of the anatomical cervix in the mesiodistal direction in girls with a very wide face.

Table 2

Percentile width of the teeth at the level of the anatomical cervix (MDDEG_) of upper and lower jaw in mesiodistal direction in boys and girls with different types of faces (mm)

Indexes	Boys		Girls			
	wide face		very wide face		wide face	
	25,0th percentl	75,0th percentl	25,0th percentl	75,0th percentl	25,0th percentl	75,0th percentl
MDDEG_11	6,0	6,5	6,0	6,3	5,6	6,0
MDDEG_12	4,7	5,3	4,3	4,9	4,2	5,1
MDDEG_13	5,5	6,0	5,0	5,5	5,0	5,4
MDDEG_41	3,4	3,8	3,2	3,7	3,4	3,8
MDDEG_42	3,7	4,0	3,5	3,9	3,6	4,0
MDDEG_43	4,9	5,5	4,3	4,8	4,5	4,9

Table 3

Morphometric computer-tomographic dimensions of the width of crowns of teeth (VSHIR_) and the width of the teeth at the level of the anatomical cervix (MDDEG_) in the mesiodistal direction in boys and girls with different facial features (mm, M±σ)

Indicator	Boys with a wide face	Girls with a wide face	p	Girls with a very wide face	p_1
VSHIR_11	8,931±0,461	8,425±0,595	<0,01	8,498±0,444	>0,05
VSHIR_12	6,912±0,500	6,387±0,616	<0,01	6,530±0,408	>0,05
VSHIR_13	8,058±0,520	7,482±0,491	<0,001	7,711±0,459	>0,05
VSHIR_14	7,144±0,280	6,670±0,420	<0,001	6,873±0,423	>0,05
VSHIR_15	6,744±0,344	6,489±0,487	=0,066	6,436±0,418	>0,05
VSHIR_16	10,47±0,37	10,21±0,59	<0,05	10,28±0,50	>0,05
VSHIR_41	5,280±0,329	4,978±0,373	<0,01	4,976±0,462	>0,05
VSHIR_42	5,754±0,267	5,459±0,422	<0,05	5,489±0,489	>0,05
VSHIR_43	6,686±0,565	6,310±0,478	<0,05	6,380±0,405	>0,05
VSHIR_44	7,232±0,338	6,807±0,454	<0,001	6,898±0,472	>0,05
VSHIR_45	7,164±0,493	7,197±0,487	>0,05	6,966±0,515	>0,05
VSHIR_46	10,98±0,49	10,51±0,60	<0,01	10,64±0,60	>0,05
MDDEG_11	6,217±0,579	5,844±0,486	<0,01	6,086±0,620	<0,05
MDDEG_12	4,990±0,447	4,609±0,604	<0,05	4,559±0,368	>0,05
MDDEG_13	5,823±0,484	5,198±0,342	<0,001	5,281±0,400	>0,05
MDDEG_41	3,553±0,262	3,596±0,405	>0,05	3,510±0,447	>0,05
MDDEG_42	3,882±0,341	3,752±0,335	>0,05	3,742±0,366	>0,05
MDDEG_43	5,241±0,661	4,712±0,353	<0,001	4,555±0,373	>0,05

Notes: p – the validity of the difference between the values of the respective indicators between boys and girls with a broad face; p_1 – the validity of the difference between the values of the respective indicators between girls with a broad and very wide face.

Comparing the results of the computer tomography of the width of the crowns of the teeth in the mesiodistal direction in boys and girls with orthognathic bite with the results of A. A. Glushak [5] obtained from boys and girls of Podillia with different types of faces obtained on gypsum models , it should be noted that among the adolescents, in most cases, there are marked divergences in the data of the size of the teeth (bigger in boys), and the difference in the width of the crowns of the teeth in the mesiodistal direction between the girls with different facials are practically absent.

Conclusion

1. In boys with a wide type of face and girls with wide and very wide facial types, with normal occlusion close to the orthognathic bite, residents of the Podillia region of Ukraine, population characteristics of the computer-tomographic size of the crowns and teeth widths at the level of the anatomical neck in the mesiodistal direction have been set.
2. In boys with a broad face type, there are significantly higher or tended to greater values of the majority of computer-tomographic size of the width of teeth crowns and teeth width at the level of the anatomical neck in the mesiodistal direction than that of girls with the corresponding face type.
3. Relevant or tendency differences of computer-tomographic size of the width of teeth crowns and teeth width at the level of the anatomical neck in the mesiodistal direction between girls with wide and very wide facials are practically not established.

Prospects for further research *are the study of other computer-tomographic sizes of teeth and dental arches in boys and girls with orthognathic bite, depending on the type of face.*

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Реферати

КОМП'ЮТЕРНО-ТОМОГРАФІЧНІ МЕЗІОДИСТАЛЬНІ РОЗМІРИ ЗУБІВ У ЮНАКІВ ТА ДІВЧАТ ІЗ ФІЗІОЛОГІЧНИМ ПРИКУСОМ В ЗАЛЕЖНОСТІ ВІД ТИПІВ ОБЛИЧЧЯ

Позур Т. П., Шінкарук-Диковицька М. М., Гаврилюк А. О. , Гненна В. О., Щерба І. К., Ясько В. В., Якубовська О. М.

Мета роботи – встановити межі процентильного розмаху та особливості комп'ютерно-томографічних мезіодистальних розмірів зубів верхньої та нижньої щелеп у юнаків і дівчат із фізіологічним прикусом в залежності від типу обличчя. Первинні комп'ютерно-томографічні розміри ширини коронок зубів і ширини зубів на рівні анатомічної шийки у мезіо-дистальному напрямку з нормальною оклюзією наближеною до ортогнатичного прикусу і кефалометричні параметри 44 юнаків та 50 дівчат Подільського регіону України отримані з банку даних науково-дослідного центру Вінницького національного медичного університету ім. М. І. Пирогова. Тип обличчя визначали за допомогою морфологічного індексу Гарсона. У юнаків і дівчат з нормальною оклюзією наближеною до ортогнатичного прикусу із різними типами обличчя визначені межі процентильного розмаху ширини коронок зубів та ширини зубів на рівні анатомічної шийки у мезіодистальному напрямку. Встановлено, що в юнаків із широким обличчям практично усі розміри ширини коронок зубів у мезіодистальному напрямку (за

КОМПЬЮТЕРНО-ТОМОГРАФИЧЕСКИЕ МЕЗИОДИСТАЛЬНЫЕ РАЗМЕРЫ ЗУБОВ У ЮНОШЕЙ И ДЕВУШЕК С ФИЗИОЛОГИЧЕСКИМ ПРИКУСОМ В ЗАВИСИМОСТИ ОТ ТИПОВ ЛИЦА

Позур Т. П., Шинкарук-Диковицкая М. М., Гаврилюк А. А. , Гненная В. О., Щерба И. К., Ясько В. В., Якубовская О. М.

Цель работы - установить границы процентильного размаха и особенности компьютерно-томографических мезиодистальных размеров зубов верхней и нижней челюстей у юношей и девушек с физиологическим прикусом в зависимости от типа лица. Первичные компьютерно-томографические размеры ширины коронок зубов и ширины зубов на уровне анатомической шейки в мезио-дистальном направлении с нормальной окклюзией приближенной к ортогнатическому прикуса и кефалометрические параметры 44 юношей и 50 девушек Подольского региона Украины получены из банка данных научно-исследовательского центра Винницкого национального медицинского университета им. Н. И. Пирогова. Тип лица определяли с помощью морфологического индекса Гарсона. У юношей и девушек с нормальной окклюзией приближенной к ортогнатическому прикусу с различными типами лица определены границы процентильного размаха ширины коронок зубов и ширины зубов на уровне анатомической шейки в мезиодистальном направлении. Установлено, что у юношей с широким лицом практически все размеры ширины коронок зубов в

винятком нижніх других малих кутніх зубів) достовірно більші або мають тенденцію до більших значень, ніж у дівчат із широким обличчям; а також в юнаків із широким обличчям більшість розмірів ширини зубів на рівні анатомічної шийки у мезіодистальному напрямку (за винятком нижніх центральних та латеральних різців) достовірно більші, ніж у дівчат із широким обличчям. При порівнянні розбіжностей комп'ютерно-томографічних розмірів ширини коронок зубів та ширини зубів на рівні анатомічної шийки у мезіодистальному напрямку між дівчатами із широким та дуже широким обличчям встановлено лише достовірно більше значення ширини верхніх центральних різців на рівні анатомічної шийки у дівчат із дуже широким обличчям.

Ключові слова: юнаки, дівчата, тип обличчя, комп'ютернатомографія, мезіодистальні розміри зубів, фізіологічний прикус, статеві відмінності.

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мезиодистальном направлении (за исключением нижних вторых малых коренных зубов) достоверно большие или имеют тенденцию к большим значениям, чем у девушек с широким лицом; а также у юношей с широким лицом большинство размеров ширины зубов на уровне анатомической шейки в мезиодистальном направлении (за исключением нижних центральных и латеральных резцов) достоверно большие, чем у девушек с широким лицом. При сравнении различий компьютерно-томографических размеров ширины коронок зубов и ширины зубов на уровне анатомической шейки в мезиодистальном направлении между девушками с широким и очень широким лицом установлено только достоверно большее значение ширины верхних центральных резцов на уровне анатомической шейки у девушек с очень широким лицом.

Ключевые слова: юноши, девушки, тип лица, компьютерная томография, мезиодистальные размеры зубов, физиологический прикус, половые различия.

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[1]I.V. Rudenko, [2]V.K. Lihachov, [1]V.P. Mischenko, [1]M.Y. Golubenko, [2]Y.Y. Shymanska
[1]Odessa National Medical University, [2]Ukrainian Medical Stomatological Academy, Poltava.

MEDICO-GENETIC DIAGNOSIS OF HEREDITARY PREDISPOSITION TO NONCARRYING OF PREGNANCY AND REPRODUCTIVE LOSSES

E-mail: vladimir.lihachev@gmail.com

The analysis of genetic models (gene grids) of genes associated with the risk for noncarrying of pregnancy: 2 collagen (COL2A1 6846C/A), plasminogen activator inhibitor-1 (RAI-1 PLANH1), superoxide dismutase (SOD1 7958 G/A), glutathione S-transferase (GSTμ1), N-acetyltransferase 2 (NAT2) has been carried out in *327 women.* Their **r**ole in reproductive losses has been shown.

Keywords: medicogenetic diagnosis, hereditary predisposition, noncarrying of pregnancy, reproductive losses.

The research study subject is "The Role of Chronic infection of uterus and the lower sections of the genital tract in the formation of obstetric and gynecological pathology" (state registration number 0117U005276).

Noncarrying of pregnancy is a pathological process in the maternal body that occurs in response to the implantation and development of the fertilized egg, which contains not only the maternal but also paternal genetic information [1,3]. In the structure of reproductive losses common miscarriage accounts for about 25%. The risk of fetal loss accounts for 13-17%, 36-38% and 40-45% after the first miscarriage, the second one and after three miscarriages, respectively [2].

Various genetic factors (chromosomal aberrations, genetic mutations, genetic predisposition) are the major causes of noncarrying of pregnancy as the multifactorial pathology at the early terms. Early spontaneous abortion is interpreted as "an evolutionary mechanism for elimination of defective offspring" [4].

Reproductive losses at the early stages of pregnancy are determined by the whole group of genes: type 2 collagen (COL2A1 6846C/A), plasminogen activator inhibitor-1 (RAI-1 PLANH1), superoxide dismutase (SOD1 7958 G/A), glutathione S-transferase (GSTμ1), N-acetyltransferase 2 (NAT2) and others [1,3]. The low level of genetic monitoring, inadequately active predictions of gestational complications are considered as the major components of the problem for noncarrying and prevention of obstetric perinatal complications [2,6]. Identification of the genetic polymorphism associated with obstetric perinatal complications enables to establish a hereditary predisposition to reproductive losses [5].

The purpose of the study was to show the role of genetic polymorphism of the genes predisposed to obstetric perinatal complications [type 2 collagen (COL2A1 6846C/A), plasminogen activator inhibitor-1 (RAI-1 PLANH1), superoxide dismutase (SOD1 7958 G/A), glutathione S-transferase (GSTμ1), N-acetyltransferase 2 (NAT2)] in the reproductive losses of the multifactorial nature.

Material and methods. 123 women have undergone screening genetic testing in the outpatient and hospital conditions for the possibilities of noncarrying of pregnancy and the risk for development of other obstetric perinatal complications. Among them 21 pregnant women with normal pregnancy, childbirth, postpartum period, who gave birth to healthy babies (Group I; the controls) have been tested.