

застосування 0,9% розчину NaCl суттєво збільшується з 3 доби, а зниження даного показника в клітинах аденогіпофізу спостерігали з 14 доби дослідження. У клітинах надниркових залоз на тлі корекції 0,9% розчином NaCl встановлено істотне збільшення показника S-фази з наступним його зниженням починаючи з 3 доби експерименту, а інтервал SUB-GOG1 також підвищувався з 1 доби з подальшим зниженням цього показника. На тлі корекції 0,9% розчином NaCl спостерігається істотне зниження показника S-фази клітин тимусу через 1 добу після опіку шкіри, а на 3 добу спостерігалось збільшення цього показника з його нормалізацією через 14 днів від початку експерименту. Показники інтервалу SUB-GOG1 клітин тимусу були підвищеними починаючи з 1 доби, але вже через 7 днів не відрізнялися від аналогічних показників групи контролю. При застосуванні розчину лактопротеїну з сорбітолом зафіксовано зниження амплітуди показників S-фази і інтервалу SUB-GOG1 клітин аденогіпофізу, наднирників і тимусу, що вказує на цитопротективний ефект даного препарату. Зроблено висновок, що при корекції 0,9% розчином NaCl недостатньо компенсується пошкодження ДНК ендокринних залоз після термічного опіку шкіри, а застосування лактопротеїну з сорбітолом істотно покращує досліджувані показники вмісту ДНК в цих органах.

Ключові слова: ДНК-цитометрія, термічне ушкодження шкіри шурів, аденогіпофіз, наднирники, тимус, лактопротеїн з сорбітолом; 0,9 % розчин NaCl.

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фрагментации ДНК) на фоне применения 0,9 % раствора NaCl существенно увеличивается с 3 суток, а снижение даного показателя в клетках аденогипофиза наблюдали с 14 суток исследования. В клетках надпочечников на фоне коррекции 0,9 % раствором NaCl установлено существенное увеличение показателя S-фазы с последующим его снижением начиная с 3 суток эксперимента, а интервал SUB-GOG1 также повышался с 1 суток с последующим снижением этого показателя. На фоне коррекции 0,9 % раствором NaCl наблюдается существенное снижение показателя S-фазы клеток тимуса через 1 сутки после ожога кожи, а на 3 сутки наблюдалось увеличение этого показателя с его нормализацией через 14 суток от начала эксперимента. Показатели интервала SUB-GOG1 клеток тимуса были повышенными начиная с 1 суток, но уже через 7 суток не отличались от аналогичных показателей группы контроля. При применении раствора лактопротеина с сорбитолом зафиксировано снижение амплитуды показателей S-фазы и интервала SUB-GOG1 клеток аденогипофиза, надпочечников и тимуса, что указывает на цитопротективный эффект даного препарата. Сделан вывод, что при коррекции 0,9 % раствором NaCl недостаточно компенсируется повреждение ДНК эндокринных желез после термического ожога кожи, а применение лактопротеина с сорбитолом существенно улучшает изучаемые показатели содержания ДНК в данных органах.

Ключевые слова: ДНК-цитометрия, термическое повреждение кожи, аденогипофиз, надпочечники, тимус, лактопротеин с сорбитолом, 0,9 % раствор NaCl.

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SEXUAL DIMORPHISM OF NORMATIVE CEPHALOMETRIC PARAMETERS DETERMINED BY THE HOLDAWAY METHOD IN BOYS AND GIRLS OF PODILLIA

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When studying individual facial harmony, one must take into account both ethnic characteristics of morphometric indices and age and sexual differences inside of the ethnic group itself. However, there are no data on the manifestations of sexual dimorphism of the cephalometric indices of soft tissues by the Holdaway method in Ukrainians. The purpose of the work is to establish sexual differences in cephalometric parameters determined by the Holdaway technique in boys and girls of Podillia region of Ukraine with orthognathic bite. With the Veraviewepocs 3D device, Morita (Japan), 38 boys (aged from 17 to 21) and 55 girls (aged from 16 to 20 years) with normal occlusion close to orthognathic bite, received side telerentgenograms and analyzed. Cephalometric points and measurements were carried out in accordance with the recommendations of R. A. Holdaway and taking into account the recommendations of A. E. Athanasiou and S. I. Doroshenko and Y. A. Kulginsky. The statistical processing of the obtained results was carried out in the licensed package "Statistica 6.0" using nonparametric methods for evaluating the obtained results. The juveniles have significantly higher or tended to higher values than girls with the following cephalometric parameters determined by the Holdaway method: Basic Upper Lip Thickness, Upper Lip Strain, H Angle, Inferior Sulcus to H Line, Soft Tissue Thickness Chin and Subnasale to H Line. Other cephalometric parameters are determined by Holdaway method (Soft tissue Facial Angle, Nose Prominence, Superior Sulcus Depth, Skeletal profile Convexity and Lower Lip's to H line) have no reliable or biased tendencies between the boys and girls.

Keywords: cephalometry, sexual dimorphism, Holdaway analysis, Ukrainian boys and girls.

Despite the immense amount of accumulated information about the structure of the human body and the perception of anatomical science as fundamental and unchanging, technological progress puts more and more complex issues and tasks for anatomists, creating a huge space for the appearance and transformation into a fundamentally new kind and quality of all branches of anatomy. Global world trends are aimed at creating a virtual world and require a huge amount of accurate information not only of a static nature, but also a description of the nature of the relationships of all elements in spatial and temporal dependence. And the dental industry, which can change the elements of soft and bone tissues of the face, constantly needs new, more accurate and improved diagnostic approaches. After all, the orthodontist practically is the only specialist who has the opportunity to influence the form and aesthetic

expression of a person's face in the deciduous and alternate period of bite. It is known that beauty, attractiveness and youth have a critical impact on our way of life, human perception in society and self-perception [2, 20].

Face as the most expressive and most open part of the human body is the main element of attention, critique and study, during the existence of mankind. Lips, as the most expressive, along with the eyes, part of the face [6], always remained at the center of attention and reflect the tendencies of the era. So in the myths of ancient Greece, the full saturated lips were considered as the standard, hence the name of the contour of the upper lip appeared - the bow of Cupid, and Aphrodite, who received the palm of the primacy, noted a very good profile and lips. But the understanding of beauty changes over time and has the influence of fashion [5, 19]. So Berneburg M. et al. study [6] are devoted to the study of the differences in the profile of soft tissues among the most popular female and male faces, from 1940 to 2008. They pointed out various trends in changing male and female beauty. It should be noted that different races and ethnic groups have their own preferences. Three-dimensional studies of the characteristics of Eurasians, Chinese and Koreans indicate the existence of reliable metric differences in the morphological characteristics of the lips [24]. But when studying individual facial harmony one should take into account not only ethnic features of morphometric indices, but also sexual and age differences inside the ethnic group. Many modern studies are devoted to the study of the gender differences in the metric characteristics of faces in different races and ethnic groups, which is confirmed by many studies. So in the work of Yun Liu and others [18] manifestations of sexual dimorphism are set in 71.43% of anthropometric parameters of the face in the populations of the Chinese and African Americans. The existence of inter-ethnic/racial facial variations is clearly demonstrated by meta-analytic research by Wen Y. F. et al. [23] who analyzed 38 representative studies of angular and linear facial parameters and demonstrated significant gender differences of nasofrontal angle, nasophacial angle and nasolabial angle. Also, manifestations of sexual facial dimorphism have been found in Colombian and Mexican-American populations [7], Egyptians and Italians [7], Chinese and Greek population [17], African-American population to an adult Caucasian-American population [22]. Studies of the Croats [3], Palestinians [16], Brazilians [21], and Persians [1] indicate the presence of ethnic characteristics, as well as intra-population gender differences in face parameters. The lack of data on sexual dimorphism manifestations of the cephalometric indices of soft tissues by the Holdaway method in Ukrainians encouraged us to conduct this study.

The purpose of the study was to establish sexual differences in cephalometric parameters determined by the Holdaway technique in boys and girls of Podillia region of Ukraine with orthognathic bite.

Material and methods. With the Veraviewepocs 3D device, Morita (Japan), 38 boys (aged from 17 to 21) and 55 girls (aged from 16 to 20 years) with normal occlusion close to orthognathic bite, received side telereöntograms and analyzed. Cephalometric points and measurements were carried out in accordance with the recommendations of R. A. Holdaway [14, 15] and taking into account the recommendations of A. E. Athanasiou [4] and S. I. Doroshenko and Y. A. Kulginsky [11].

According to the Holdaway method, the following indicators (Fig. 1, Fig. 2) were studied: **P_Or_N'Hold_Pog' angle** - (Soft Tissue Facial Angle) - formed by Po-Or lines and N'Hold-Pog' line; **angle N'Hold_Pog'_Hline** - (H Angle) - formed by lines Ls-Pog' (Holdaway line) and N'Hold-Pog'; **distance A_N_Pog** - (Skeletal Profile Convexity) - distance from point A to line N-Pog (faceplate); **distance Ls1u_Ls** - (Upper Lip Strain) - the distance from the cutting edge of the upper incisor Ls1u to the edge of the upper lip Ls; **distance Pog_Pog'** - (Soft Tissue Thickness Chin) - distance from point Pog to point Pog'; **distance SS_Ns** - (Nose Prominence) - the distance from the point Ss to the nose end Ns performed parallel to the Frankfurt area (Po-Or); **distance SS_Ls** - (Superior Sulcus Depth) - from the point Ss to the perpendicular Po-Or (Frankfurt horizontal), through the point Ls; **distance A'_SS** - (Basic Upper Lip Thickness) - distance from point A' to point Ss; **distance Sn_H line** - (Subnasale to H Line) - distance from point Sn to line Ls-Pog' (H-line); **distance Li_H line** - (Lower Lip to H Line) - distance from point Li to line Ls-Pog' (H line); **distance Sm_H line** - (Inferior Sulcus to H Line) - distance from Sm to line Ls-Pog' (H line). *Cephalometric points:* A - **subspinale** - point A by Douns, the most posteriorly located point of the anterior contour of the upper jaw; A' - the point, which is located 3 mm below point A, is used to measure the thickness of the lower lip in the Holdaway analysis; Ls1u - the most prominent point of the bristle contour of the crown of the upper middle cutter; Li - **labium inferius** - the most prominent point of the outer contour of the red margin of the lower lip; Ls - **labium superius** - the most prominent point of the outer contour of the red rim of the upper lip; N - **nasion** - the most forward point of the fronto-nasal seam, joints of the frontal and nasal bones in the medial-arterial plane; N - skin nasion by Holdaway - the point of intersection of the S-N line with the contour of the skin; Ns,

also known as (**pr-pronasale**) - the most prominent point of the nose tip; **Or** - orbitale - the lowest part of the infraorbital edge, located on the eyelid margin of the caudal bone; **Po** - porion - placed on the upper edge of the external ear canal; **Pog'** - the most prominent skin point of the chin, also determined by a tangent lowered from the point **N'**; **Pog** - pogonion - the most forward point of bone chin projection; **S** - sella - constructive point in the center of the Turkish saddle; **Sm** - supra mentale - the most rearwardly located point of the lip-chin fold; **Sn** - subnasale - a cutaneous point, located on the place of transition of the lower nasal contour to the upper lip; **SS** - sulcus superior - skin point, the most rearward positioned point placed between inferior contour of the nose and the upper lip.

The statistical processing of the obtained results was carried out in the licensed package "Statistica 6.0" using nonparametric methods for evaluating the obtained results. The reliability of the difference between independent quantitative values was determined using the Man-Whitney U-criterion.

Results of the study and their discussion. In the analysis of cephalometric parameters by the Holdaway method between boys and girls of the Podillia region of Ukraine with normal occlusion close to orthognathic bite, we have established the following sexual differences:

the values of *Basic Upper Lip Thickness* are significantly higher ($p < 0,001$) (a very useful indicator when comparing it with the thickness of the lips at the level of vermillion, which allows to estimate the level of tension or existing inconsistency of the lips that cover abnormal incisors) in boys ($16,27 \pm 1,52$) than girls ($13,31 \pm 1,82$);

reliable ($p < 0,001$) higher values of *Upper Lip Strain* (it allows to estimate the state of the upper lip tongue and also an indicator of vertical buccal disturbances. Thus decreasing this index, indicating that the lips thinness overlying vestibularly located incisors; as well as a decrease in the index is noted with an increase vertical height of the face. If this figure is significantly greater than the indicator of the thickness of the base of the upper lip A'_SS then it indicates a lack of growth of the facial skeleton in the vertical plane and, as a rule, observed with a deep overlap of the front teeth) in boys ($14,74 \pm 1,49$), than girls ($12,25 \pm 1,63$);

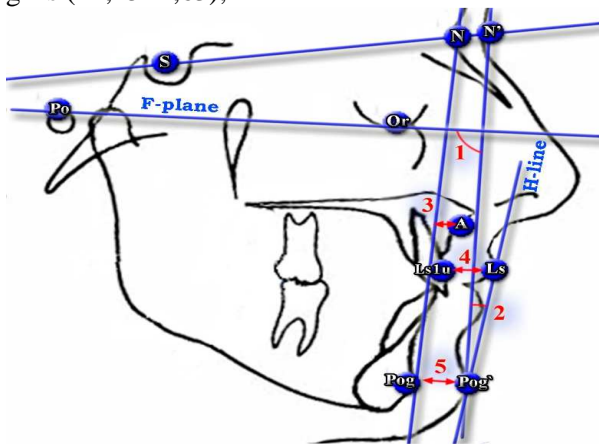


Fig. 1. Cephalometric measurements using the method of R. A. Holdaway. 1) Soft Tissue Facial Angle ($P.Or.N'Hold.Pog'$); 2) H Angle ($N'Hold.Pog'.Hline$); 3) Skeletal Profile Convexity ($A.N.Pog$); 4) Upper Lip Strain ($LstLs$); 5) Soft Tissue Thickness Chin ($Pog.Pog'$).

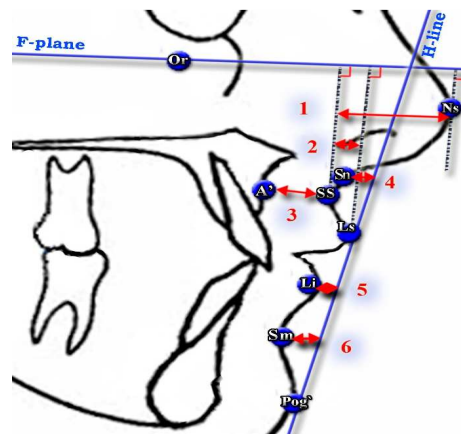


Fig. 2. Cephalometric measurements using the method of R. A. Holdaway. 1) Nose Prominence ($SS.Ns$); 2) Superior Sulcus Depth ($SS.Ls$); 3) Basic Upper Lip Thickness ($A'.SS$); 4) Subnasale to H Line ($Sn.Hline$); 5) Lower Lip to H Line ($Li.Hline$); 6) Inferior Sulcus to H Line ($Sm.Hline$).

H Angle values are significantly higher ($p < 0,01$) (it allows to determine the maximum aesthetic position of the upper lip contour, taking into account the individual characteristics of the convexity of the skeletal profile of a person. Holdaway recommends to determine the individual value of this angle, adding 10 degrees to the value of the dimension of the convexity of the skeletal profile. The value of the angle of 10 degrees, with a convexity of 0 mm supposed to be ideal. The value of the angle when taking into account the values of the skeletal convexity and the depth of the nasopharyngeal fold can be a good benchmark for determining the position of the central incisors in the anterior and posterior directions, which allows obtaining full support for the upper lip and its natural non-elastic position) in boys ($14,05 \pm 4,84$) than girls ($11,10 \pm 4,18$); significant ($p < 0,001$) higher values of *Inferior Sulcus to H Line* (it is a convenient indicator of the vestibular-tongue inclination of the lower incisors, which during orthodontic treatment may improve or worsen the chin and chin furrow exposure) in boys ($6,238 \pm 1,648$) than girls ($4,872 \pm 1,537$); significant ($p < 0,001$) higher values of *Soft Tissue Thickness Chin* (may vary greatly and needs to be taken into account when moving the frontal upper and lower jaw teeth group in the anterior-posterior direction to create optimal lips support) in boys ($12,60 \pm 1,74$) than girls ($11,31 \pm 1,87$); the expressed tendency ($p = 0,052$) to the higher values of the *Subnasale to H Line* (may

vary greatly and needs to be taken into account when moving the frontal group of upper and lower jaw teeth in the anterior-posterior direction to create optimal lip support) in boys ($4,800 \pm 2,315$) than girls ($3,855 \pm 1,898$). All other cephalometric parameters are determined by Holdaway method (Soft tissue Facial Angle, Nose Prominence, Superior Sulcus Depth, Skeletal profile Convexity and Lower Lip's to H line) have no reliable or biased tendencies between the boys and girls of the Podillia region of Ukraine with normal occlusion close to orthognathic bite.

It should be noted that in previous studies, when analyzing cephalometric parameters in other methods, we also found sexual differences [8-10, 12, 13]. Thus, during the conduct of cephalometric analysis according to S. Steiner, there were significantly higher values in boys for the following indicators – Relation and Position of Lower Incisors to NB-line, Anterior Length of Cranial Base and Posterior Length of Cranial Base. Significantly larger than the value in girls was only indicator of inclination of the occlusal plane to the Anterior Cranial Base [10]. In the analysis of cephalometric data obtained by Gottfried P. F. Schmuth gender discrepancies were detected for the following indicators – Vertical Facial Profile, Soft Tissue Balance, Angle between the palatal plane and the mandibular plane, which are bigger in girls and indicators of Convex, which determines the convexity of the soft tissue profile and Distance from the labial outline of the crown of the most prominent lower incisor to the line N-B, which determines the position of the lower incisors in relationship to the vertical line N-B, which are bigger in boys [8].

The main differences between the Ukrainian boys and girls according to the data of the cephalometric analysis of Charles H. Tweed International Foundation were established for linear indicators that were significantly higher in boys – indicator Wits, Upper Lip Thickness, Total Chin Thickness, Posterior Facial Height, Anterior Facial Height and AFH/PFH Ratio, as well as significantly higher values in girls angle between Frankfurt Horizontal and occlusal plane [12].

In the study of cephalometric indices by the J. McNamara method, significantly higher values were established in boys for the following indices: Effective Length of Maxilla, Effective Length of Mandible, Maxillomandibular Difference, Length of the Lower Part of the Anterior Facial Height. In girls significantly higher was only Basal Angle Basal Angle [13]. There were also established gender differences of cephalometric data, oriental by method A.M. Schwarz. Thus, indicators Anterior Cranial Base Length, Mandibular Length, Maxillary Length and Ramus Length were significantly higher in boys, and Basis Angle and Inclination Angle rates were significantly higher in girls [9].

Conclusion

In boys with normal occlusion, close to orthognathic bite, more than half of the cephalometric parameters by the Holdaway method (Basic Upper Lip Thickness, Upper Lip Strain, H Angle, Inferior Sulcus to H Line, Soft Tissue Thickness Chin, Subnasale to H Line) are significantly higher or tend to be larger than girls.

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Реферати

СТАТЕВИЙ ДИМОРФІЗМ НОРМАТИВНИХ ЦЕФАЛОМЕТРИЧНИХ ПАРАМЕТРІВ ВИЗНАЧЕНИХ ЗА МЕТОДОМ ХОЛДАВЕЯ В ЮНАКІВ ТА ДІВЧАТ ПОДІЛЛЯ

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При вивченні індивідуальної лицеві гармонії слід враховувати як етнічні особливості морфометричних показників, так і вікові та статеві відмінності в середині самої етнічної групи. Однак дані щодо проявів статевого диморфізму цефалометричних показників м'яких тканин за методом Холдавея у українців відсутні. Метою нашого дослідження є встановлення статевих розбіжностей цефалометричних параметрів, що визначені за методикою Холдавея у юнаків і дівчат Подільського регіону України з ортогнатичним прикусом. За допомогою пристрою Veraviewerocs 3D, Моріта (Японія) у 38 юнаків (віком від 17 до 21 року) та 55 дівчат (віком від 16 до 20 років) з нормальною оклюзією наближеною до ортогнатичного прикусу були отримані та проаналізовані бокові телерентгенограми. Цефалометричні точки та вимірювання проводили згідно рекомендацій R. A. Holdaway, та з урахуванням рекомендацій А. Е. Athanasiou та С. І. Дорошенко і С. А. Кульгинського. Статистична обробка отриманих результатів проведена в ліцензійному пакеті "Statistica 6,0" з використанням непараметричних методів оцінки отриманих результатів. В юнаків встановлені достовірно більші, або тенденція до більших значень ніж у дівчат наступних цефалометричних параметрів, що визначаються за методом Холдавея: товщина основи верхньої губи, товщина Верміліона верхньої губи, кут Холдавея, відстань від точки Sm до Н-лінії, товщина м'яких тканин підборіддя та відстань від точки Sn до Н-лінії. Інші цефалометричні параметри визначені за методом Холдавея (м'якотканний лицевий кут, глибина носа, глибина носо-губної складки, опуклість скелетного профілю та відстань нижньої губи до Н-лінії) не мають достовірних, або тенденцій розбіжностей між юнаками і дівчатами.

Ключові слова: цефалометрія, статевий диморфізм, аналіз Холдавея, українські юнаки та дівчата.

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ПОЛОВОЙ ДИМОРФИЗМ НОРМАТИВНЫХ ЦЕФАЛОМЕТРИЧЕСКИХ ПАРАМЕТРОВ УСТАНОВЛЕННЫХ С ПОМОЩЬЮ МЕТОДА ХОЛДАВЕЯ У ЮНОШЕЙ И ДЕВУШЕК ПОДОЛЬЯ

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При изучении индивидуальной лицевой гармонии следует учитывать как этнические особенности морфометрических показателей, так и возрастные и половые отличия в середине самой этнической группы. Однако данные относительно проявлений полового диморфизма цефалометрических показателей мягких тканей за методом Холдавея у украинцев отсутствуют. Целью нашего исследования являлось установление половых различий цефалометрических параметров определенных с помощью метода Холдавея у юношей и девушек подольского региона Украины с ортогнатическим прикусом. С помощью устройства Veraviewerocs 3D, Морита (Япония) у 38 юношей (в возрасте от 17 до 21 года) и 55 девушек (в возрасте от 16 до 20 лет) с нормальной окклюзией приближенной к ортогнатическому прикусу были получены и проанализированы боковые телерентгенограммы. Цефалометрические точки и измерения проводили согласно рекомендациям R. A. Holdaway, а также с учетом рекомендаций А. Е. Athanasiou и С. И. Дорошенко, Е. А. Кульгинского. Статистическая обработка полученных результатов проведена в лицензионном пакете "Statistica 6,0" с использованием непараметрических методов оценки полученных результатов. У юношей установлены достоверно большие, или тенденция к большим значениям нежели у девушек следующих цефалометрических параметров, которые определяются с помощью метода Холдавея: толщина основы верхней губы, толщина Вермилиона верхней губы, угол Холдавея, расстояние от точки Sm до Н-линии, толщина мягких тканей подбородка и расстояние от точки Sn до Н-линии. Другие цефалометрические параметры определенные с помощью метода Холдавея (мягкотканый лицевой угол, глубина носа, глубина носо-губной складки, выпуклость скелетного профиля и расстояние нижней губы до Н-линии) не имеют достоверных, или тенденций различий между юношами и девушками.

Ключевые слова: цефалометрия, половой диморфизм, анализ Холдавея, украинские юноши и девушки.

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