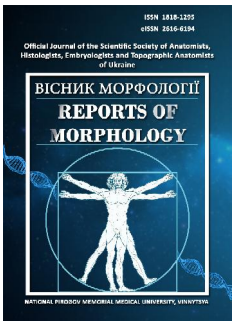
DOI: 10.31393/morphology-journal-2023-29(2)-01 Reports of Morphology, Vol. 29, №2, Pages 5-11

ISSN 1818-1295 eISSN 2616-6194

REPORTS OF MORPHOLOGY

Official Journal of the Scientific Society of Anatomists, Histologists, Embryologists and Topographic Anatomists of Ukraine

journal homepage: https://morphology-journal.com



Determination of cephalometric parameters according to the COGS method, related to the profile of the soft tissues of the face depending on the types of faces in Ukrainian young men and young women with an orthognathic bite

Nesterenko Ye. A., Shinkaruk-Dykovytska M. M., Muntian V. L., Prokopenko S. V., Kyrychenko V. I.
National Pirogov Memorial Medical University, Vinnytsia, Ukraine

ARTICLE INFO
Received: 12 January 2023
Accepted: 14 February 2023

UDC: 616.714.1-071.3(477)

CORRESPONDING AUTHOR
e-mail: tikhonova_123@ukr.net
Nesterenko Ye. A.

CONFLICT OF INTEREST
The authors have no conflicts of interest to declare.

FUNDING
Not applicable.

The use of cephalometric analysis of lateral teleroentgenograms allows orthodontists, maxillofacial surgeons and other related specialists to organize a patient's treatment plan. However, for the full application of this method, it is necessary to determine in advance which indicators for it can be considered the norm, and which are already a pathology. The purpose of the study is to establish the peculiarities of cephalometric parameters according to the COGS method, related to the profile of the soft tissues of the face, in Ukrainian young men and young women with an orthognathic bite with different facial types. 46 young men and 72 young women who belonged to the residents of Ukraine of the Caucasian race in three generations and had an orthognathic bite were subjected to cephalometry according to the COGS method of indicators related to the profile of the soft tissues of the face. The face type was determined according to Garson's morphological index. Statistical processing of the obtained results was carried out in the license package "Statistica 6.0" using non-parametric estimation methods. Among Ukrainian young women with different types of faces, the following reliable or trends of differences in teleroentgenometric indicators related to the profile of soft tissues of the face according to the COGS method were established: young women with a very wide face have smaller values of the Gl'-Sn-Pog' angle and the Sn-Gn'/H-Gn' ratio (compared to the middle and narrow faces) and the angle Cotg-Sn-Ls and the distance Ls-(Sn-Pog') (compared to the middle face); young women with a wide face have larger values of the Ls-(Sn-Pog') distance and smaller values of the Stms-I distance (compared to the average face type); women with a narrow face have larger values of the Gl'-Sn distance and the Gl'-Sn/Sn-Me' ratio (compared to the medium face), the Sn-Gn'/H-Gn' ratio (compared to the wide face) and smaller values of the distance Sm-(Li-Pog') (compared to the wide face). Among Ukrainian young men with different types of faces, the following reliable or trends of differences in teleroentgenometric indicators related to the profile of soft tissues of the face according to the COGS method were established: representatives with a very wide face have larger values of the Gl'-Pog' distance (compared to an average face) and smaller values of Sn-Gn'/H-Gn' ratio and Stms-I distance (compared to the average face); representatives with a wide face have larger values of the Sn-Stms/Stmi-Me ratio (compared to the average face) and smaller values of the Gl'-Sn/Sn-Me' ratio (compared to the average face); representatives with a narrow face have larger values of the Gl'-Sn/Sn-Me' ratio (compared to very wide and wide faces). Minor manifestations of sexual dimorphism of cephalometric parameters determined by the COGS method related to the profile of the soft tissues of the face were also established between young men and young women with different facial types.

Keywords: *teleradiography, cephalometry according to the COGS method, cephalometry, indicators of the profile of soft tissues of the face, young men, young women, orthognathic bite, facial types, gender differences.*

Introduction

Bite pathology is one of the most common in orthodontist practice. The results of the examination of almost 2,000 schoolchildren from Saudi Arabia revealed that 1,219 of them have a molar ratio of class I, 326 - class II and 154 -

class III. Among the most common signs of malocclusion, the authors noted bulging teeth, an increase in the space between the teeth, overbite, crossbite, front open bite [2]. Another common pathology is the presence of supernumerary teeth. According to the literature, this pathology occurs in 0.3-0.8 % of people with non-permanent and 1.5-3.5 % of people with permanent dentition. It is also noted that this pathology occurs more often among men than women (the ratio of patients is 2:1, respectively) and more often on the upper jaw than the lower [3]. Manifestations of sexual and age-related dimorphism were also found when studying the prevalence of impacted teeth [16]. Agenesis of teeth occurs in 2.2-10.1 % of people and has a pronounced ethnic heterogeneity of distribution. It is most common among the white population of Australia, where it is found in 6.3 %, the least common among the white population of North America - 3.9 % [5].

The cost of orthodontic treatment varies considerably depending on the method used and the country. In Finland, the average cost of providing orthodontic care to children and adolescents varies between 517-926 euros, in Great Britain it is 36-2941 euros [18].

The prevalence and diversity of orthodontic pathology, the high cost of its treatment have led to the rapid development of instrumental methods for both diagnosis and treatment of this pathology. One of the methods of treatment planning is cephalometric analysis, which became widespread and recognized in the first half of the 20th century [20, 23].

The accuracy of cephalometric analysis of lateral teleroentgenograms is extremely high. Thus, when compared with direct craniometric measurement, the error is less than 1 mm. In general, when comparing the data, the Co-Gn, Go-Me, Co-ANS indicators had higher values in direct craniometry, while all other indicators had lower values [7]. Currently, scientific and technical progress allows, in addition, to use computer tomography data for cephalometric analysis. Nevertheless, the use of traditional lateral teleroentgenograms is almost in no way inferior in terms of informativeness and accuracy to data obtained by analyzing computer tomography data [13].

However, this method requires appropriate clinical research to be implemented in the practice of orthodontists.

The purpose of the study is to establish the peculiarities of cephalometric parameters according to the COGS method, related to the profile of the soft tissues of the face, in Ukrainian young men and young women with an orthognathic bite with different facial types.

Materials and methods

46 young men (YM) (aged 17 to 21) and 72 young women (YW) (aged 16 to 20) underwent a cephalometric study of lateral teleroentgenograms obtained using a Veraviewepocs 3D Morita dental cone-beam tomograph. All young men and women applied to the private dental clinic "Vinintermed" for a diagnostic examination, belonged in three generations to residents of Ukraine of the Caucasian race and had a physiological bite that was as close as possible to the orthognathic one. Committee on Bioethics of National Pirogov Memorial Medical University, Vinnytsya (protocol № 8 From 30.09.2021) found that the studies do not contradict the basic bioethical standards of the Declaration of Helsinki, the Council of Europe Convention on Human Rights and Biomedicine (1977), the relevant WHO regulations and laws of Ukraine.

Cephalometry was performed according to the COGS method [6]. The OnyxCeph³™ software, version 3DPro, from Image Instruments GmbH, Germany (software license №URSQ-1799) was used for this analysis. The face type YM and YW is determined, respectively, by the value of Garson's morphological index [19].

The main cephalometric points and measurements according to the COGS method, including indicators of the structures of the *soft profile* of the face (Fig. 1):

Gl'-Sn-Pog' (facial convexity angle, convex) - the angle formed by the lines Gl'-Sn and Sn-Pog' (°);

Gl'-Sn (maxillary prognathism) - distance from the point Gl' to point Sn, which is measured parallel to the horizontal line HR-Line (mm);

Gl'-Pog' (mandibular prognathism) - distance from the point Gl' to point Pog', which is measured parallel to the horizontal line HR-Line (mm);

Sn-Gn'-C (lower face - neck angle, lower face - throat angle) - the angle formed by the lines Sn-Pog' and Me'-C(H) (°).

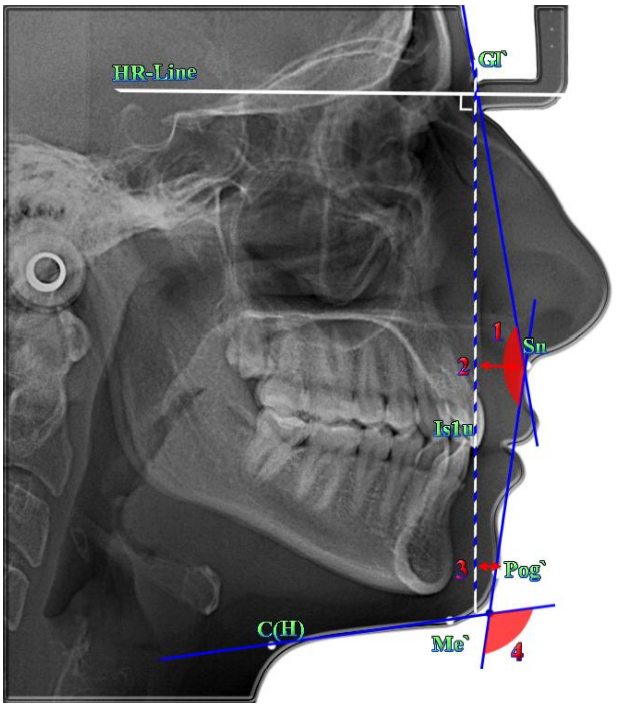


Fig. 1. Indicators of soft facial profile structures using the COGS method, characterizing the shape of the facial profile: 1 - angle **Gl'-Sn-Pog'**; 2 - distance **Gl'-Sn**; 3 - distance **Gl'-Pog'**; 4 - angle **Sn-Gn'-C**.

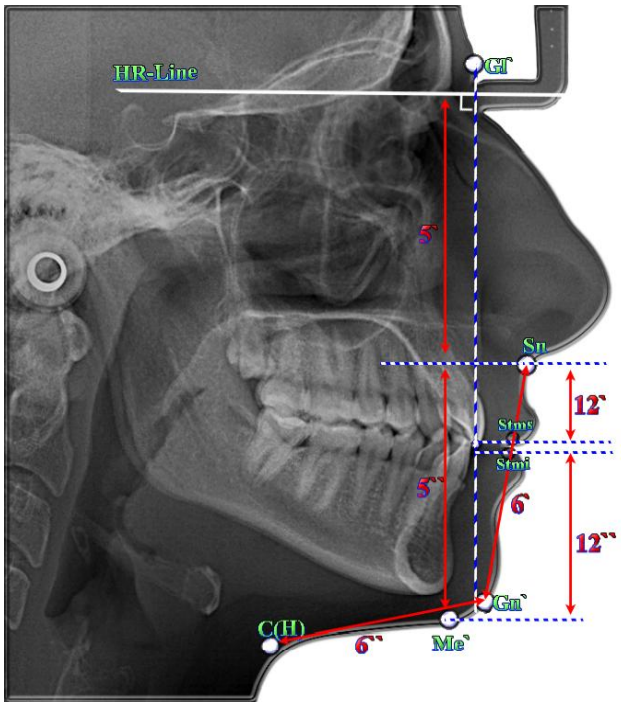


Fig. 2. Calculated indicators of soft facial profile structures using the COGS method, characterizing the *shape of the facial profile*: 5 - ratio **Gl'-Sn(5')/Sn-Me'(5'')**; 6 - ratio **Sn-Gn'(6')/C-Gn'(6'')**; and the position and *shape of the lips*: 12 - ratio **Sn-Stms(12')/Stmi-Me'(12'')**.

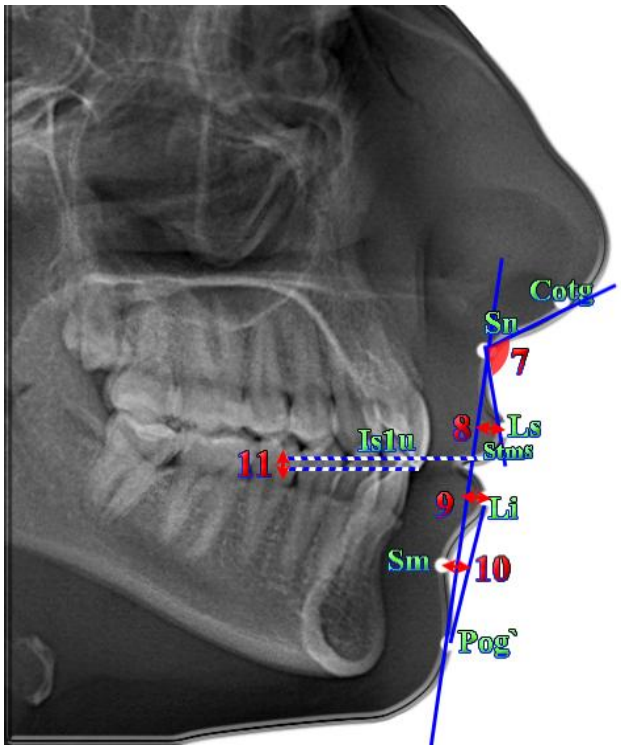


Fig. 3. Indicators of the structures of the soft profile of the face according to the COGS method, characterizing the position and shape of the lips: 7 - angle **Cotg-Sn-Ls**; 8 - distance **Ls-(Sn-Pog')**; 9 - distance **Li-(Sn-Pog')**; 10 - distance **Sm-(Li-Pog')**; 11 - distance **Stms-I**.

Calculated indicators of *soft facial profile* structures according to the COGS method, characterizing the *shape of the facial profile and the position and shape of the lips* (Fig. 2):

Gl'-Sn/Sn-Me' - vertical height ratio, vertical Facial Profile;

Sn-Gn'/C-Gn' - lower vertical height-depth ratio;

Sn-Stms/Stmi-Me' (vertical lip-chin ratio) - ratio of distances Sn-Stms and Stmi-Me' (%).

Indicators of the structures of the *soft profile* of the face according to the COGS method, characterizing the *position and shape of the lips* (Fig. 3):

Cotg-Sn-Ls (nasolabial angle) - the angle formed by the lines Cotg-Sn and Sn-Ls (°);

Ls-(Sn-Pog') (upper lip protrusion) - distance from the point Ls to line Sn-Pog' (mm);

Li-(Sn-Pog') (lower lip protrusion) - distance from the point Li to line Sn-Pog' (mm);

Sm-(Li-Pog') (mentolabial sulcus) - distance from the point Sm to line Li-Pog' (mm);

Stms-I (maxillary incisor exposure) - distance from the point Stms to point Is1u (mm).

Statistical processing of the results was carried out in the license package "Statistica 6.0" using non-parametric estimation methods. Mean values and standard deviation were determined. The significance of the difference in values between independent quantitative values was determined using the Mann-Whitney U-test.

Results

The following distribution of young people according to the value of the Garson index was established: YM - 5 with a very wide face, 22 with a wide face, 11 with an average face, 8 with a narrow face; YW - 25 very wide face, 25 wide face, 10 medium face, 12 narrow face.

Tables 1 and 2 present the results of teleroentgenometric values according to the COGS method, related to the profile of the soft tissues of the face in boys or girls with an orthognathic bite with different types of faces.

Also, between YM and YW with different types of faces, the following gender differences in the indicators related to the profile of soft tissues of the face were established, namely, larger values:

in YM, larger values of the distance Gl'-Sn (with wide, $p<0.05$ and the average face, $p=0.057$), the distance Gl'-Pog' (with the average face, $p=0.062$), as well as the angle Sn-Gn'-C (with wide face $p<0.05$);

in YW larger values are the Sm-(Li-Pog') and Stms-I distances (with a very wide face, $p=0.059$, $p=0.089$), Sm-(Li-Pog') distances (with a wide face, $p<0.001$ and medium face, $p<0.05$), the Cotg-Sn-Ls angle (with a narrow face, $p=0.083$) and the Gl'-Sn/Sn-Me' ratio (with a wide face, $p<0.05$).

Discussion

When comparing Ukrainian YM or YW with an orthognathic bite with different facial types of indicators

Table 1. The value of COGS teleroentgenometric indicators related to the profile of facial soft tissues in YM with different types of face (M±σ).

Indicator	Face type				p_{1-2}	p_{1-3}	p_{1-4}	p_{2-3}	p_{2-4}	p_{3-4}
	Very Wide (1)	Wide (2)	Average (3)	Narrow (4)						
Angle Gl'-Sn-Pog'	12.00±6.44	13.73±6.03	13.09±6.01	9.875±6.468	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Distance Gl'-Sn	9.800±5.630	7.367±4.541	6.546±3.804	5.125±3.871	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Distance Gl'-Pog'	7.800±8.927	0.591±9.303	-0.546±5.989	-0.125±5.693	>0.05	**=0.070**	>0.05	>0.05	>0.05	>0.05
Ratio Gl'-Sn/Sn-Me'	93.40±13.16	95.77±8.29	100.9±6.5	106.6±7.6	>0.05	>0.05	**=0.057**	**=0.076**	**<0.01**	>0.05
Angle Sn-Gn'-C	110.4±11.1	112.4±8.2	108.6±11.0	109.4±7.1	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Ratio Sn-Gn'/H-Gn'	102.6±19.0	120.4±24.6	125.6±24.2	117.0±16.0	>0.05	**=0.070**	>0.05	>0.05	>0.05	>0.05
Angle Cotg-Sn-Ls	104.0±9.4	105.4±10.1	106.9±13.8	99.13±11.54	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Distance Ls-(Sn-Pog')	3.200±1.483	3.318±1.912	2.818±1.471	3.750±1.581	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Distance Li-(Sn-Pog')	1.400±2.074	2.091±1.974	1.636±1.748	2.375±1.685	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Distance Sm-(Li-Pog')	-6.200±1.304	-5.864±0.941	-5.727±0.905	-6.000±1.195	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Ratio Sn-Stms/Stmi-Me	46.40±3.85	46.91±6.93	42.91±4.18	44.50±3.46	>0.05	>0.05	>0.05	**=0.079**	>0.05	>0.05
Distance Stms-I	1.600±1.140	2.136±1.754	2.818±1.079	2.625±1.302	>0.05	**=0.089**	>0.05	>0.05	>0.05	>0.05

Notes: here and in the following table, M±σ - sample mean ± standard deviation; $p_{(1-2,\ 1-3,\ 1-4,\ 2-3,\ 2-4,\ 3-4)}$ - the validity of the differences in scores between the corresponding face types in YM or YW.

Table 2. The value of COGS teleroentgenometric indicators related to the profile of facial soft tissues in YW with different facial types (M±σ).

Indicator	Face type				p_{1-2}	p_{1-3}	p_{1-4}	p_{2-3}	p_{2-4}	p_{3-4}
	Very Wide (1)	Wide (2)	Average (3)	Narrow (4)						
Angle Gl'-Sn-Pog'	8.880±5.718	11.56±5.90	13.00±4.62	13.75±4.45	>0.05	**<0.05**	**<0.05**	>0.05	>0.05	>0.05
Distance Gl'-Sn	5.320±3.750	4.440±3.583	3.330±3.057	6.250±3.223	>0.05	>0.05	>0.05	>0.05	>0.05	**<0.05**
Distance Gl'-Pog'	2.000±5.781	-2.240±5.555	-5.300±4.347	-1.417±5.107	>0.05	**<0.01**	>0.05	>0.05	>0.05	**=0.070**
Ratio Gl'-Sn/Sn-Me'	103.4±10.4	102.7±12.4	99.70±10.63	108.2±9.2	>0.05	>0.05	>0.05	>0.05	>0.05	**=0.081**
Angle Sn-Gn'-C	103.2±9.6	104.6±9.2	105.2±7.1	106.5±7.3	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Ratio Sn-Gn'/H-Gn'	105.6±17.7	112.8±21.9	123.9±31.2	121.6±11.6	>0.05	**<0.05**	<0.01	>0.05	**=0.077**	>0.05
Angle Cotg-Sn-Ls	104.0±8.5	105.7±8.3	110.8±8.4	108.0±11.7	>0.05	**=0.074**	>0.05	>0.05	>0.05	>0.05
Distance Ls-(Sn-Pog')	2.120±1.641	3.200±1.414	2.200±1.476	3.000±1.859	>0.05	>0.05	>0.05	**=0.086**	>0.05	>0.05
Distance Li-(Sn-Pog')	1.160±2.115	2.080±1.913	2.500±1.509	2.250±1.603	>0.05	**=0.093**	>0.05	>0.05	>0.05	>0.05
Distance Sm-(Li-Pog')	-5.000±1.041	-4.120±2.205	-4.600±0.966	-5.250±1.138	>0.05	>0.05	>0.05	>0.05	**<0.05**	>0.05
Ratio Sn-Stms/Stmi-Me	43.68±3.85	47.60±5.67	45.40±5.36	46.50±4.72	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Distance Stms-I	2.600±0.957	2.360±1.411	3.400±1.350	2.667±1.670	>0.05	>0.05	>0.05	**=0.065**	>0.05	>0.05

related to the profile of facial soft tissues according to the COGS method, more pronounced differences are established between YW with different facial types, namely (see Table 2):

in YW with a *very wide face*, significantly smaller values or trends of the Gl'-Sn-Pog' angle and the Sn-Gn'/H-Gn' ratio (compared to the medium and narrow face types), the Cotg-Sn-Ls angle, and Ls-(Sn-Pog') distances (compared to the average face type);

in YW with a *wide face*, there is a tendency for larger Ls-(Sn-Pog') distance values (compared to the average face type) and a tendency for smaller Stms-I distance values (compared to the average face type);

YW with *narrow face* have significantly greater, or trends toward, greater values of Gl'-Sn distance (compared to medium face type), Sn-Gn'/H-Gn' ratio (compared to wide face type), Gl'-Sn/Sn-Me' ratio (compared to the medium face type), as well as a significantly smaller value of the Sm-(Li-Pog') distance (compared to the wide face type).

Between Ukrainian YM with different types of faces, a significantly smaller number of reliable, or trends, indicators of differences related to the profile of the soft tissues of the face according to the COGS method were established (see Table 1):

in YM with a *very wide face*, there is a tendency towards larger values of the Gl'-Pog' distance (compared to the

average face type) and a tendency towards smaller values of the Sn-Gn'/H-Gn' ratio and the Stms-I distance (compared to average face type);

in *broad-faced* YM, a tendency towards higher Sn-Stms/Stmi-Me ratio values (compared to the average face type) and a tendency towards lower values of the Gl'-Sn/Sn-Me' ratio (compared to the average face type);

in YM with a *narrow face*, significantly higher, or a trend towards higher values of the value of the ratio of Gl'-Sn/Sn-Me' (compared to very wide and wide face types).

Minor manifestations of sexual dimorphism of indicators related to the profile of the soft tissues of the face were also established, namely: larger values, in most cases in YM with wide and medium face types - values of Gl'-Sn distances, Gl'-Pog' distances (only with an average face type), Sn-Gn'-C angle (only with a wide face type); and in YW - values of Sm-(Li-Pog') and Stms-I distances (with very wide face type), Sm-(Li-Pog') distance (with wide and medium face types), Cotg-Sn-Ls angle (with narrow face type) and Gl'-Sn/Sn-Me' ratio (with wide face type).

COGS analysis is an excellent tool that is actively used for the assessment and planning of orthodontic treatment, which involves various types of surgical interventions, such as osteotomies, genioplasty and other interventions on the maxillo-dental apparatus [8, 11, 12, 15].

In a previous study, we analyzed COGS cephalometric parameters that characterize the position of individual teeth in boys and girls with an orthognathic bite and different facial types. As a result, pronounced manifestations of sexual dimorphism were found for both linear and angular indicators, namely, YW have higher values of the OP-HP angle, and YM have higher values of most linear dimensions [14].

Indeed, taking into account as many parameters as possible is important when conducting cephalometric studies. Yes, the type of face affects the position of the hyoid bone. Significant differences were found for SNB, ANB and NSH indicators in different groups [1].

It is also important to take into account the age of the examined persons. Bergman R. T. with co-authors [4] investigated changes in the soft tissue structures of the face of persons aged 6 to 18 years using COGS analysis. In particular, with age, such indicators as the lower face height, the thickness of the upper and lower lips, the length of the upper lip and the lower lip-chin length increase, the interlabial gap and the contour of the furrow of the lower jaw decrease. Some indicators do not change with age: the angle of the face profile, the nasolabial angle, the upper and lower protrusion of the lips.

The existence of sex differences in terms of indicators of soft tissue structures of the face is also a proven fact. In men, higher values of the thickness of the soft tissues of the face were found in representatives of the maxillofacial class I, II and III. The most significant differences were found for the index of the furrow of the upper lip ($t=3.772$; $p<0.001$) [17].

And of course, the ethnic component is important. A group of researchers [9] revealed soft tissue cephalometric indicators that are different ($p<0.05$) for Nigerians, Ghanaians and Senegalese: length of the upper lip, Li-esthetic line, angle of the tip of the nose, N-Pr-Pg, Pg-Ls, B-N pogonion and pogonion-mandibular angle. In addition, such indicators as the nasolabial angle, mentolabial angle, depth of the nose, general convexity of the soft tissues of the face are excellent for the mentioned nationalities and Europeans.

Differences were also found for the Japanese population, which, compared to the European population, has higher average face projection values [22].

Regarding the inhabitants of Northern India, differences were also found in the COGS analysis indicators compared to European data, namely, they have lower values of the base of the skull, height of the face, higher values of the chin protrusion and the inclination of the mandibular incisors [10]. A similar kind of study, however, regarding residents of East India revealed the following features compared to European data: higher values of protrusion of the upper and lower lips, prognathia of the lower jaw [21].

Conclusion

1. Between Ukrainian YW (more pronounced) or YM with different types of faces who have an orthognathic bite, reliable or trends of discrepancies of teleroentgenometric indicators related to the profile of soft tissues of the face according to the COGS method were established.

2. Between YM and YW with the corresponding facial types, the manifestations of sexual dimorphism of teleroentgenometric indicators related to the profile of the soft tissues of the face according to the COGS method are slightly expressed.

References

[1] Amayeri, M., Saleh, F., & Saleh, M. (2014). The position of hyoid bone in different facial patterns: A lateral cephalometric study. *European scientific journal,* 10(15), 19-34.

[2] Asiry, M. A., & AlShahrani, I. (2019). Prevalence of malocclusion among school children of Southern Saudi Arabia. *Journal of orthodontic science,* 8, 2. doi: 10.4103/jos.JOS_83_18

[3] Ata-Ali, F., Ata-Ali, J., Penarrocha-Oltra, D., & Penarrocha-Diago, M. (2014). Prevalence, etiology, diagnosis, treatment and complications of supernumerary teeth. *Journal of clinical and experimental dentistry*, 6(4), e414-e418. doi: 10.4317/jced.51499

[4] Bergman, R. T., Waschak, J., Borzabadi-Farahani, A., & Murphy, N. C. (2014). Longitudinal study of cephalometric soft tissue profile traits between the ages of 6 and 18 years. *The Angle Orthodontist,* 84(1), 48-55. doi: 10.2319/041513-291.1

[5] Bozga, A., Stanciu, R. P., & Manuc, D. (2014). A study of prevalence and distribution of tooth agenesis. *Journal of medicine and life,* 7(4), 551-554. PMID: 25713620

[6] Burstone, C. J., James, R. B., Legan, H., Murphy, G. A., & Norton, L. A. (1979). Cephalometrics for orthognathic surgery. *J. Oral. Surg,* 36, 269-277. PMID: 273073

[7] Durao, A. R., Bolstad, N., Pittayapat, P., Lambrichts, I., Ferreira,

A. P., & Jacobs, R. (2014). Accuracy and reliability of 2D cephalometric analysis in orthodontics. *Revista Portuguesa de Estomatologia, Medicina Dentaria e Cirurgia Maxilofacial,* 55(3), 135-141. doi: 10.1016/j.rpemd.2014.05.003

[8] Ekram, S., Arunkumar, K. V., Mowar, A., & Khera, A. (2021). Evaluation of stability and esthetic outcome following rigid fixation of a new sagittal genioplasty technique-A clinical study. *National Journal of Maxillofacial Surgery,* 12(1), 17-24. doi: 10.4103/njms.NJMS_76_20

[9] Fadeju, A. D., Otuyemi, O. D., Ngom, P. I., & Newman-Nartey, M. (2013). A study of cephalometric soft tissue profile among adolescents from the three West African countries of Nigeria, Ghana and Senegal. *Journal of orthodontics,* 40(1), 53-61. doi: 10.1179/1465313312Y.0000000033

[10] Girhe, V., Borle, R., Datey, P., Shirivastav, S., & Bhola, N. (2022). Cephalometric norms for the north Indian population: A systematic review. *National Journal of Maxillofacial Surgery,* 13(2), 172-179. doi: 10.4103/njms.NJMS_34_20

[11] Harshitha, K. R., Srinath, N., Christopher, S., & Kumar, H. N. (2014). Evaluation of soft and hard tissue changes after anterior segmental osteotomy. *Journal of clinical and diagnostic research: JCDR*, 8(9), ZC07-10. doi: 10.7860/JCDR/2014/9409.4791

[12] Lingeshbabu Pawar, A., Basavapattana Shivasubramanya, J., Kolothu Parambil, S., Shivamoga Raju, A., & Debata, A. (2021). Cephalometric Analysis of Hard and Soft Tissue Changes Following Anterior Maxillary Osteotomy Distraction in Cleft Maxillary Hypoplasia. *Journal of Maxillofacial and Oral Surgery,* 20, 680-688. doi: 10.1007/s12663-020-01404-0

[13] Navarro, R. D. L., Oltramari-Navarro, P. V. P., Fernandes, T. M. F., Oliveira, G. F. D., Conti, A. C. D. C. F., Almeida, M. R. D., & Almeida, R. R. D. (2013). Comparison of manual, digital and lateral CBCT cephalometric analyses. *Journal of Applied Oral Science,* 21, 167-176. doi: 10.1590/1678-7757201302326

[14] Nesterenko, Y. A., Shinkaruk-Dykovytska, M. M., Chugu, T. V., Dudik, O. P., & Gunas, V. I. (2022). Determination of cephalometric parameters according to the COGS method, which characterize the position of individual teeth relative to cranial structures depending on the types of faces in Ukrainian young men and young women with an orthognathic bite. *Reports of Morphology,* 28(3), 32-37. doi: 10.31393/morphology-journal-2022-28(3)-05

[15] Parappallil, C. J., Parameswaran, R., Vijayalakshmi, D., & Mavelil, B. G. T. (2018). A comparative evaluation of changes in soft tissues after single-jaw surgery and bimaxillary surgery in skeletal class III Patients. *Journal of Maxillofacial and Oral Surgery,* 17, 538-546. doi: 10.1007/s12663-017-1079-7

[16] Pedro, F. L., Bandeca, M. C., Volpato, L. E., Marques, A. T., Borba, A. M., Musis, C. R., & Borges, A. H. (2014). Prevalence of impacted teeth in a Brazilian subpopulation. *The journal of contemporary dental practice,* 15(2), 209-213. doi: 10.5005/jp-journals-10024-1516

[17] Perovic, T., & Blazej, Z. (2018). Male and female characteristics of facial soft tissue thickness in different orthodontic *malocclusions evaluated by cephalometric radiography. Medical science monitor,* 24, 3415-3424. doi: 10.12659/MSM.907485

[18] Pietila, I., Pietila, T., Svedstrom-Oristo, A. L., Varrela, J., & Alanen, P. (2013). Comparison of treatment costs and outcome in public orthodontic services in Finland. *The European Journal of Orthodontics,* 35(1), 22-28. doi: 10.1093/ejo/cjr053

[19] Proffit, U. R., Fildz, G. U., & Saver, D. M. (2006). *Современная ортодонтия* (перевод с английского Д. С. Персина) [*Modern orthodontics* (translation from English by D. S. Persina)]. M.: МЕДпресс-информ - M.: MEDpress-inform.

[20] Qamruddin, I., & Alam, M. K. (2015). Cephalometry: is it just an orthodontic record?. *Bangladesh Journal of Medical Science,* 14(4), 313-315. doi: 10.3329/bjms.v14i4.23078

[21] Sahoo, N., Mohanty, R., Mohanty, P., Nayak, T., Nanda, S. B., & Garabadu, A. (2016). Cephalometric norms for east Indian population using Burstone Legan analysis. *Journal of International Oral Health*, 8(12), 1076-1081. doi: 10.2047/jioh-08-12-06

[22] Shindoi, J. M., Matsumoto, Y., Sato, Y., Ono, T., & Harada, K. (2013). Soft tissue cephalometric norms for orthognathic and cosmetic surgery. *Journal of Oral and Maxillofacial Surgery,* 71(1), e24-e30. doi: 10.1016/j.joms.2012.08.015

[23] Tanna, N. K., AlMuzaini, A. A., & Mupparapu, M. (2021). Imaging in orthodontics. *Dental Clinics*, 65(3), 623-641. doi: 10.1016/j.cden.2021.02.008

ВИЗНАЧЕННЯ ЦЕФАЛОМЕТРИЧНИХ ПАРАМЕТРІВ ЗА COGS-МЕТОДОМ, ЩО ВІДНОСЯТЬСЯ ДО ПРОФІЛЮ М'ЯКИХ ТКАНИН ОБЛИЧЯ В ЗАЛЕЖНОСТІ ВІД ТИПІВ ОБЛИЧЧЯ В УКРАЇНСЬКИХ ЮНАКІВ І ДІВЧАТ ІЗ ОРТОГНАТИЧНИМ ПРИКУСОМ

Нестеренко Є. А., Шінкарук-Диковицька М. М., Мунтян В. Л., Прокопенко С. В., Кириченко В. І.

Застосування цефалометричного аналізу бокових телерентгенограм дозволяє ортодонтам, зубо-щелепним хірургам та іншим суміжним спеціалістам спланувати план лікування пацієнта. Проте, для повноцінного застосування цього методу необхідно попередньо визначити, які показники для нього можуть вважатися нормою, а що вже є патологією. Мета дослідження - в українських юнаків і дівчат із ортогнатичним прикусом і з різними типами обличчя встановити особливості цефалометричних параметрів за COGS-методом, що відносяться до профілю м'яких тканин обличя. 46 юнакам і 72 дівчатам, які належали у трьох колінах до мешканців України європеоїдної раси та мали ортогнатичний прикус, проведено цефалометрію за COGS-методом показників, що відносяться до профілю м'яких тканин обличя. Тип обличчя визначено відповідно морфологічного індексу Гарсона. Статистичну обробку отриманих результатів проводили в ліцензійному пакеті "Statistica 6.0" з використанням непараметричних методів оцінки. Між українськими дівчатами з різними типами обличчя встановлені наступні достовірні або тенденції відмінностей телерентгеноментричних показників, що відносяться до профілю м'яких тканин обличчя за COGS-методом: у представниць із дуже широким обличчям - менші значення величини кута Gl'-Sn-Pog' і співвідношення Sn-Gn'/H-Gn' (порівняно з середнім і вузьким обличчями) та кута Cotg-Sn-Ls і відстані Ls-(Sn-Pog') (порівняно з середнім обличчям); у представниць із широким обличчям - більші значення величини відстані Ls-(Sn-Pog') та менші значення величини відстані Stms-I (порівняно з середнім типом обличчя); у представниць із вузьким обличчям - більші значення величини відстані Gl'-Sn і співвідношення Gl'-Sn/Sn-Me' (порівняно з середнім обличчям), співвідношення Sn-Gn'/H-Gn' (порівняно з широким обличчям) та менші значення величини відстані Sm-(Li-Pog') (порівняно з широким обличчям). Між українськими юнаками з різними типами обличчя встановлені наступні достовірні або тенденції відмінностей телерентгеноментричних показників, що відносяться до профілю м'яких тканин обличчя за COGS-методом: у представників

із дуже широким обличчям - більші значення величини відстані Gl'-Pog' (порівняно з середнім обличчям) та менші значення величини співвідношення Sn-Gn'/H-Gn' і відстані Stms-I (порівняно з середнім обличчям); у представників із широким обличчям - більші значення величини співвідношення Sn-Stms/Stmi-Me (порівняно з середнім обличчям) та менші значення величини співвідношення Gl'-Sn/Sn-Me' (порівняно з середнім обличчям); у представників із вузьким обличчям - більші значення величини співвідношення Gl'-Sn/Sn-Me' (порівняно з дуже широким і широким обличчям). Між юнаками та дівчатами з різними типами обличчя також встановлені незначні прояви статевого диморфізму цефалометричних параметрів визначених за COGS-методом, що відносяться до профілю м'яких тканин обличчя.

Ключові слова: *телерентгенографія, цефалометрія за COGS-методом, кефалометрія, показники профілю м'яких тканин обличя, юнаки, дівчата, ортогнатичний прикус, типи обличчя, статеві розбіжності.*