



MANDIBULAR CEPHALOMETRIC INDICATORS OF FRONTAL CEPHALOGRAMS IN REPRESENTATIVES OF THE UZBEK POPULATION

**Murtazaev Saidmurodkhon Saidialoevich,
Kuchkarova Muxayyo Kuranbayevna,
Abbasova Diyora Baxtiyarovna,
Saydaliyev Mukhiddin Nizomiddin o'g'li,
Dinikulov Jurabek Abdunabiyevich**

Tashkent State Dental Institute, 103 Makhtumkuli Street, Tashkent, Uzbekistan.

Article History Received: 12 July 2023 Revised: 10 September 2023 Accepted: 10 Nov 2023 CC License CC-BY-NC-SA 4.0	Abstract: Morphological parameters of mandible were investigated according to the frontal cephalogram by “Grummons” in 95 (55 men and 40 women) representatives of Uzbek population with normal physiological pricus whose ages were 18-30. Mandibular indicators investigated by transverse and vertical directions. These indicators are used to diagnose and treat anomalies of the maxillofacial area, which are found in the lower third of the face. Key words: mandibular morphology, analysis by “Grummons”, normal jaw bite, Uzbek population.
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Introduction

A beautiful face is not only beauty, but also part of science. It is a proportional system that embodies the width, symmetry, and morphological balance of the face. The demands of orthodontic patients can be overwhelming, but orthodontists try to overcome these challenges as much as possible. In order to eliminate orthodontic problems, first of all, it is necessary to identify, diagnose and quickly treat deformations of teeth, bones and soft tissues. For this purpose, the most effective methods of assessing the morphology of the facial structure are presented in many literatures, and one of them is the detection of asymmetry in the frontal cephalogram [1, 2,11].

The symmetry of the facial structure, the proportionality of the right and left sides, and the morphology of the face have been studied by many scientists. Hewitt AB, Ricketts RM., Grayson B.H. and Cappeyne V.D. scientists like developed and proposed methods for determining frontal cephalometric indicators in their scientific research. Including Grummons D.C. conducted many studies on the frontal cephalogram and developed his system of frontal cephalometric indicators [8,9,10].

To determine the frontal cephalometric indicators according to Grummons, a mid-sagittal line-MSR is performed and the symmetry of the right and left sides of the skull is compared in the transverse and vertical directions. In the course of this research, it was identified and proposed easy and convenient methods for measuring frontal cephalometry for clinicians[3,4].

We also identified the mandibular morphological indicators, which are the main part of these cephalometric indicators, in representatives of the Uzbek population and compared them with the indicators proposed by the author.

The purpose of this study was to determine mandibular morphological indicators in frontal cephalogram by “Grummons” in representatives of Uzbek population with normal physiological pricus, and to compare them with the indicators of the author Grummons.

Materials and Methods

Examination was carried out in total of 95 (55 men and 40 women) representatives of the Uzbek population with physiological normal pricus. They were investigated to determine mandibular morphological indicators of the frontal cephalogram according to “Grummons”.

Using the angular and linear measurements of the cephalogram analysis, we can obtain comprehensive information about the structure of the facial bones. This is the reason why we started our research by studying these dimensions. First, we need to identify the difference in measurements depending on gender. To answer this question, measurements were created on the cephalograms of 55 men and 40 women. The obtained results were processed statistically and presented in tables.

Grummons established mandibular morphology and proved its special importance in determining frontal cephalogram indicators.

To measure “mandibular morphological” indicators of the frontal cephalogram - we determined seven linear and one angular indicators on the facial bones. The points of the mandibular morphological indicators of the frontal cephalogram are shown in Fig. 1 and the lines for connecting these points are shown in Fig. 2. The names of points and surfaces in the determination of frontal cephalometric indicators are given in tables 1 and 2. All data were statistically analysed into MS Office Excel – (t-criterion Student's t-test) where the arithmetic mean (M), mean square deviation (s), standard error (m), estimated width (frequency, %), Student's t-criterion (t) and was conducted using reliability indices (P).

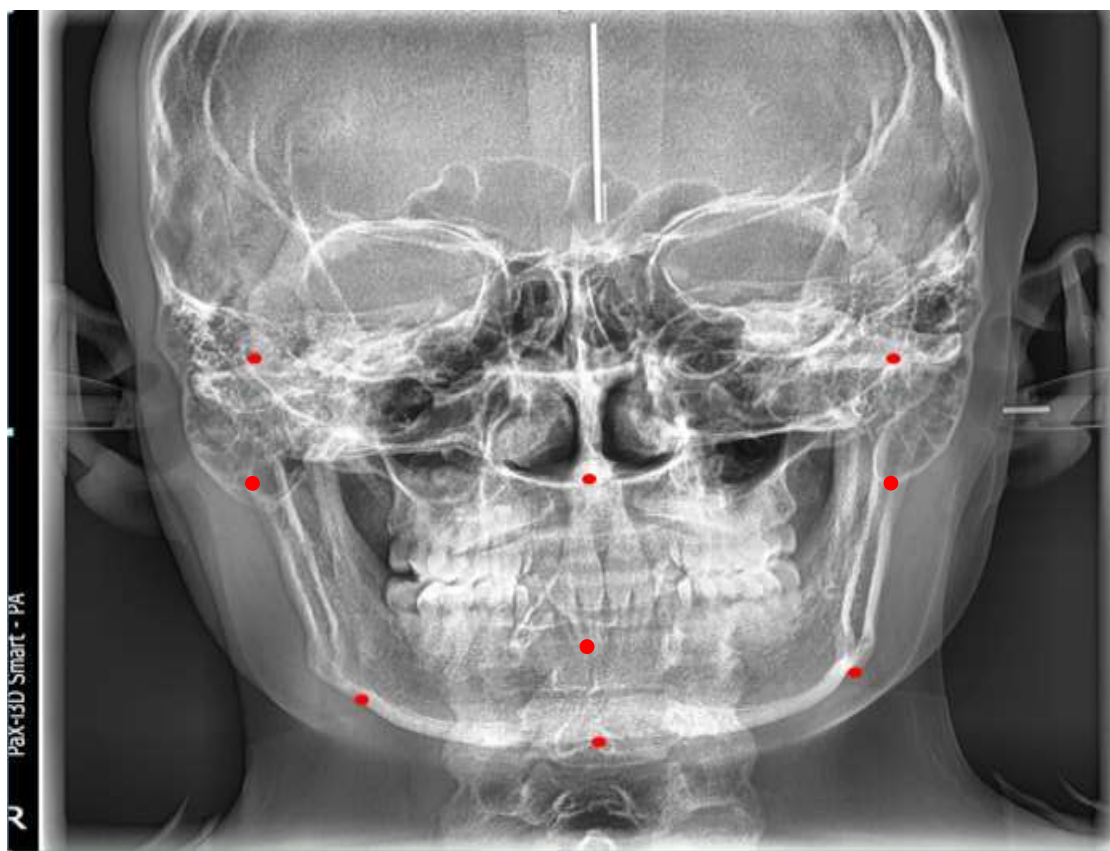


Fig 1. Points (Landmarks) used in the determination of mandibular morphological indicators of the frontal cephalogram

Table 1.

Points (Landmarks) used in measurement of mandibular morphological indicators of the frontal cephalogram

№	Cephalometric points	Points names of the frontal cephalogram (Landmarks)
1	Ag	The groove of the corner of the lower jaw (Antegonial Notch)
2	ANS	Anterior point of the base of the nose (Anterior Nasal Spine)
3	Co	The apex of the mandibular joint head (Condylion)
4	Me	Chin center (Menton)

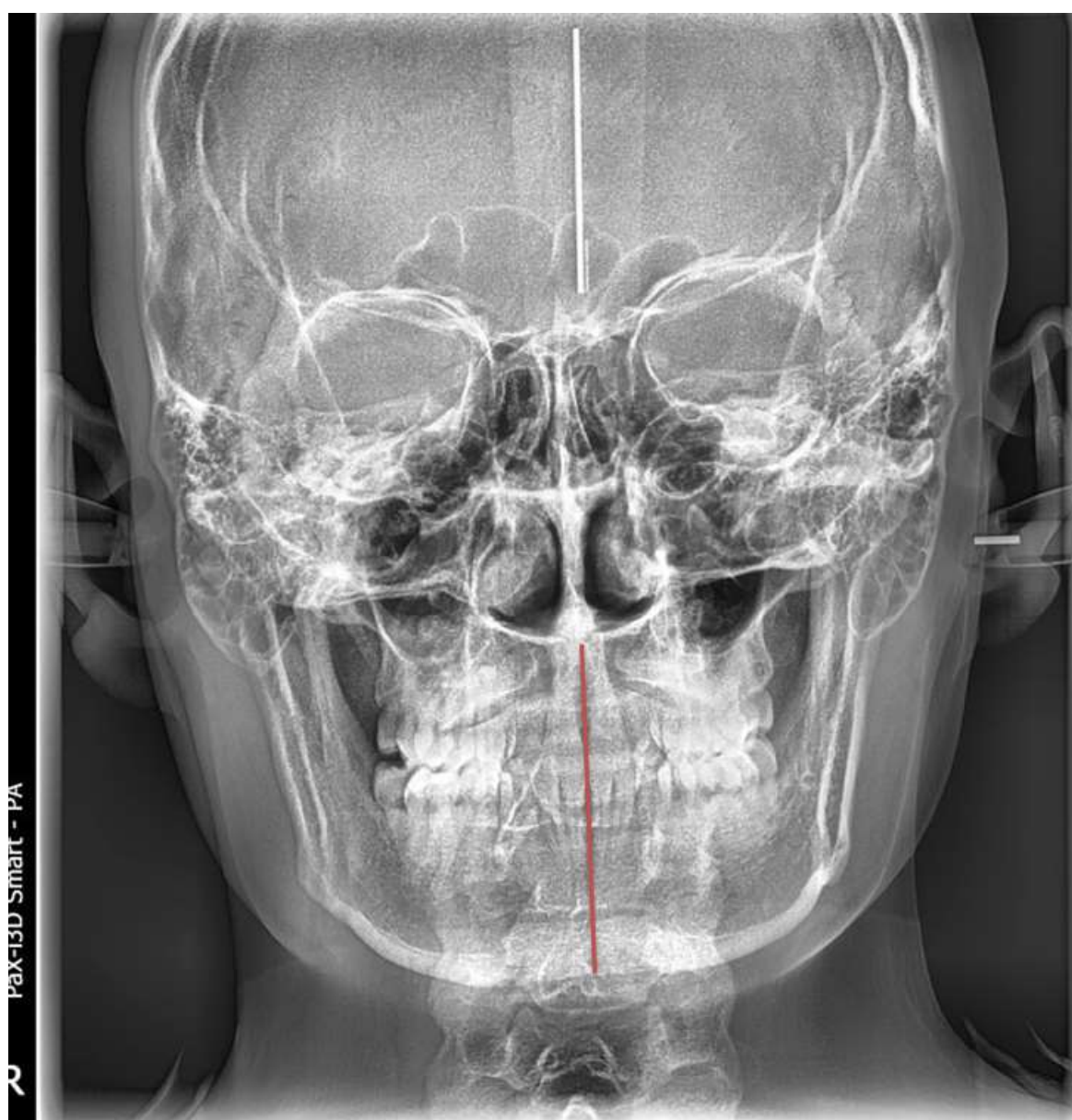


Fig 2. The line connecting the base of the nose with the center of the chin.



Fig 3. The surface connecting the groove of lower jaw angle and head (Condylion - Antegonial notch plane)



Fig 4. The surface connecting the groove of the angle of the lower jaw and the head (Condylion - Antegonial notch plane).



Fig 5. The groove of the angle of the lower jaw joint from Ag point, surface connecting middle of the chin - the Me point (Antegonial notch- Condylion plane)

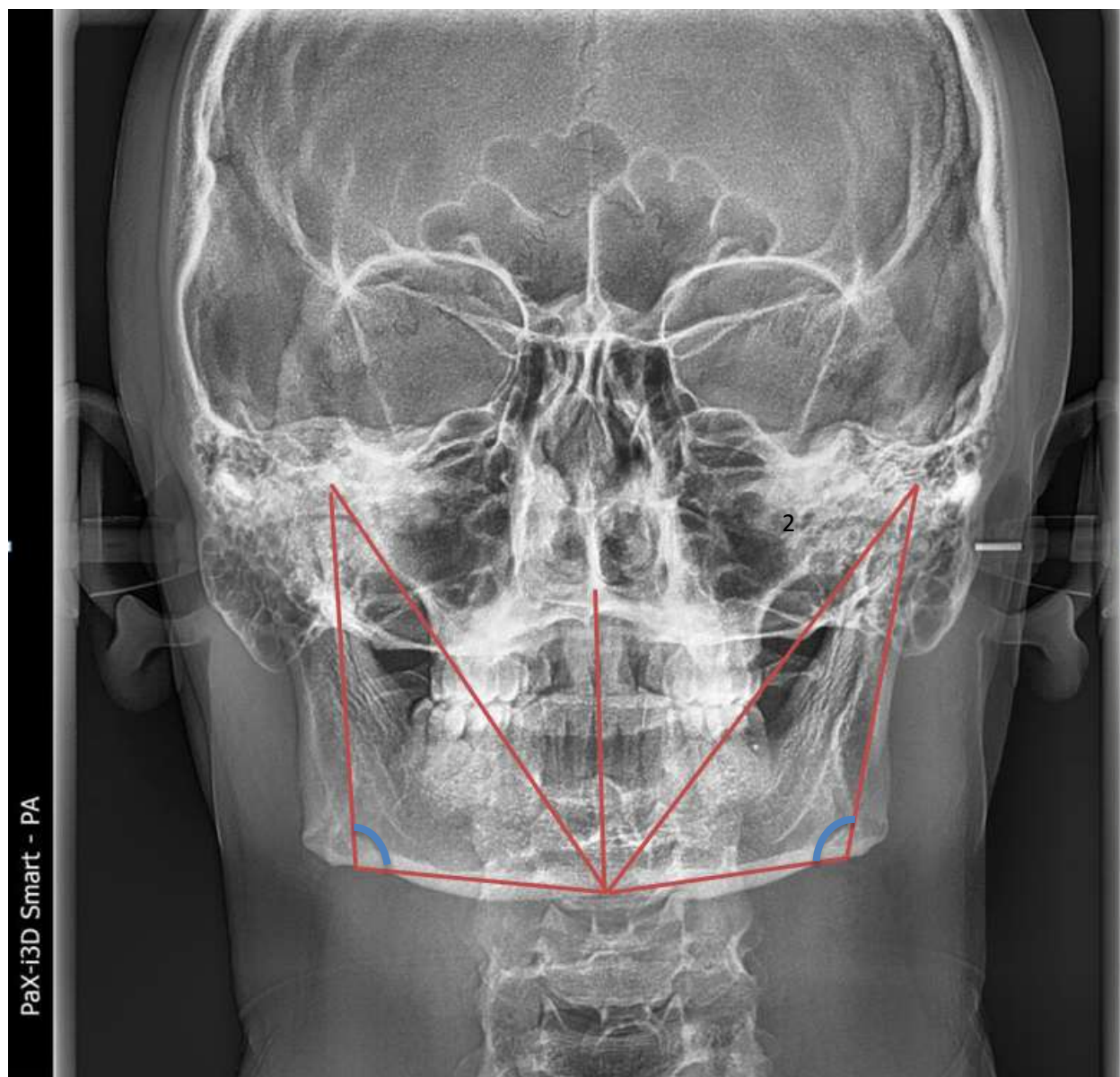


Fig 6. Surfaces and mandibular angle used in the analysis of mandibular morphology of the frontal cephalogram (Gonial angle).

Table 2.

Names of surfaces used in the analysis of mandibular morphology of the frontal cephalogram

№	Latin designation of surfaces	Surfaces that produce mandibular morphological indicators
1	Co-MSR	MSR - connecting the point So with the midsagittal line (Condylion - Mid-sagittal reference plane)
2	Co-Ag	The surface connecting the groove of the angle of the lower jaw and the head (Condylion - Antegonial notch plane)
3	Co-Me	The surface connecting the head of the mandibular joint - point Co, the middle of the chin - point Me (Condylion - Menton plane)
4	Ag- Me	The groove of the angle of the lower jaw joint - from the Ag point, the surface connecting the middle of the

		chin - the Me point (Antegonial notch- Condylion plane)
5	Go ang-	Angle of the lower jaw (Gonial angle).
6	ANS-Me	The line connecting the base of the nose with the center of the chin.

As we mentioned above, Grummons created several conveniences in measuring the mandibular morphological indicators of his frontal cephalometry. Below, we provide detailed information about the method of determining the mandibular morphological index proposed by the author and determine the mandibular morphological indicators of frontal cephalometry in representatives of the Uzbek population, and compare them with each other and the indicators proposed by the author. **Morphological indicators of the lower jaw (mandibular).** In the frontal cephalogram of the lower jaw, we determine the structure of the lower jaw, the symmetry of its projection, and its morphology in this section in a linear and angular way. In the analysis of the morphology of the lower jaw, points Co, Ag, Me are in the main place. If we connect these points together, a triangle will be formed, but first, we will divide the lower jaw in two by drawing a vertical line from Me to ANS. Then we connect the MeCoAg points (Figure-2). In the world literature, it is emphasized that in normal physiological pricus, the triangles on both sides of the lower jaw should be symmetrical. In this regard, we also determined the symmetry of the lower jaw in the representatives of the ethnic group, the length of the lines forming the triangle in millimeters and the angles in degrees, and we placed it in the table.

Results and Discussion

First of all, a line (surface) was drawn from the point So, where the peak of the mandibular joint head was calculated, to the point Me, which is the center of the chin, again from the So point on the top of the mandibular joint head to the groove Ag of the lower jaw angle, and again from the point Ag of the lower jaw angle to the center of the chin the length of the lines transferred to the Me point was determined, and the right and left sides were compared.

Table 3.

Indicators of the analysis of the morphology of the lower jaw of representatives of the Uzbek population (n=95)

Line name (Variables)	Direction	Females (N=40) (M±m)	SD	Males (N=55) (M±m)	SD	Average (Men and women) (N=95) (M±m)	SD
Me- Ag(mm)	R	43,93±0,51	3,21	43,95±0,38	2,82	43,93±0,31	2,99
	L	43,18±0,50	3,19	43,78 ±0,33	2,92	43,53±0,31	3,04
Me- Co(mm)	R	95,88±0,85*	5,73	98,25±0,72^	5,34	97,23±0,56	5,48
	L	95,40±0,90	5,74	98,18±0,74^	5,46	97,04±0,59	5,73
Co- Ag(mm)	R	63,63±0,57*	3,62	68,96±0,62^	4,62	66,71±0,51	4,98
	L	63,95±0,65	4,13	69,00±0,58*^	4,30	66,87±0,50	4,91
Co- MSR(mm)	R	51,25±0,57	3,62	52,93±0,57	2,48	52,22±0,32	3,12
	L	51,45±0,57	3,61	52,91±0,31	2,27	52,29±0,30	2,99
Co-Ag-Me	R	121,08±0,98	6,20	118,33±0,66^	4,90	119,48±0,58	5,64

(degree)	L	122,38±1,18	7,48	118,18±0,72 [^]	5,74	119,94±0,58	6,65
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* - P<0,05 persuasive differences from averages

[^] - P<0,05 persuasive differences compared to women's performance.

We can see from table 3 that the Me-Ag indicators of male and female representatives of the Uzbek population are right 43.93±0.51 mm and left 43.18±0.50 in women, right 43.95±0.38 mm and left -43.78±0 in men. 33mm, and no statistically significant difference was found when comparing them (P>0.05). The Me-Co indicator is equal to the right 95.88±0.85 mm, left 95.40±0.90 mm in women, right 98.25±0.72 mm and left 98.18±0.74 mm in men, and when compared statistically there are reliable differences (P<0.05). The average Me-Co indicator of representatives of the Uzbek population is equal to the right-97.23±0.56mm, left-97.04±0.59mm, and when comparing the Me-Co indicators of men and women compared to this Me-Co average indicator, only the indicators of women relatively reliable difference was found (P<0.05). According to the results of the Co-Ag indicator, the average Co-Ag indicator is equal to right-66.71±0.51mm and left-66.87±0.50mm. Right-63.63±0.57 and left 63.95±0.65 mm in women and Co-Ag indicator in men was right 68.96±0.62mm and left 69.00±0.58mm, when they were compared a reliable difference was found (P<0.05). When comparing the average Co-Ag indicator and the same indicators of women and men, reliable differences were found in the right side Co-Ag indicator of women and the left side Co-Ag indicator of men compared to the average Co-Ag indicator (P<0.05). Co-Ag-Me angle, considered as the basis of mandibular morphology, is right-121.08±0.98° and left 122.38±1.18° in women, right-118.33±0.66° and left-118 in men. It was found to be 18±0.72°, and when they were compared, a statistically significant difference was found (P<0.05). It is also shown in the table that the average values of the right-119.48±0.58° and the left-119.94±0.58° are equal to the average Co-Ag-Me angle of women and men of the same Co-Ag-Me angle. when the indicators were compared, there were no significant differences in the indicators of this angle of both women and men compared to the average Co-Ag-Me angle (P>0.05).

Comparison of obtained personal results with the author's indicators

We needed the author's data to compare the indicators of the analysis of the lower jaw morphology of the representatives of the Uzbek population with the indicators proposed by the author - Grummons. For this, we studied several articles of the author and used the most favorable indicators [5, 6, 7]. In Table 4, we compare the mandibular indicators of male and female representatives of the Uzbek population with the mandibular indicators of women and men determined by the author.

Table 4.

Comparison of indicators of lower jaw morphology analysis between representatives of Uzbek population and author Grummons indicators (in mm and degrees)

Line name (Variables)	Sex	N	Direction	Indicators of Uzbek population (M±m)	SD	N	Indicators of author Grummons (M±m)	SD
Me-Ag(mm)	F	40	R	43,93±0,51	3,21	15	45,8±0,64	3,55
			L	43,18±0,50	3,19		46,4±0,51	3,24
	M	55	R	43,95±0,38*	2,82	15	49,7±0,34	2,35
			L	43,78 ±0,33*	2,92		50,5±0,66	2,79
Me-Co(mm)	F	40	R	95,88±0,85	5,73	15	99,4±0,91	4,55
			L	95,40±0,90	5,74		99±0,88	4,39
	M	55	R	98,25±0,72*	5,34	15	104±0,95	5,91

			L	98,18±0,74*	5,46		104,5±0,89	5,88
Co-Ag(mm)	F	40	R	63,63±0,57	3,62	15	66±0,54	3,14
			L	63,95±0,65	4,13		64,2±0,53	4,16
	M	55	R	68,96±0,62	4,62	15	68,5±0,6	4,22
			L	69,00±0,58	4,30		67,7±0,49	4,15
Co-MSR(mm)	F	40	R	51,25±0,57	3,62	15	53,7±0,59	3,55
			L	51,45±0,57	3,61		53,7±0,49	3,6
	M	51	R	52,93±0,57*	2,48	15	56,4±0,55	3,57
			L	52,91±0,31*	2,27		56,8±0,53	3,22
Co-Ag-Me (degree)	F	40	R	121,08±0,98	6,20	15	121,1±0,94	5,95
			L	122,38±1,18	7,48		122,4±0,89	7,15
	M	55	R	118,33±0,66	4,90	15	122,1±0,91	5,12
			L	118,18±0,72*	5,74		123±0,88	5,88

* - P<0,05 convincing differences compared to Uzbek indicators

Me-Ag indicators of male and female representatives of the Uzbek population are right 43.93±0.51 mm and left 43.18±0.50 in women, right 45.8±0.64 mm and left -43.78 ±0 in men. is equal to 33. According to Grummons, Me-Ag indicators are equal to 43.93±0.51 mm right in women and 46.4±0.51 mm in left, in men right- 49.7±0.34 mm and left - 50.5±0.66 mm. When compared with the Uzbeks, a statistically reliable difference was found only in relation to the Me-Ag indicators of men (P<0.05).

Me-Co index of Uzbeks: right- 95.88±0.85 mm, left 95.40±0.90 mm in women; the right 98.25±0.72mm and the left 98.18±0.74mm in men are presented in the tables. Now the author's Me-Co indicators are equal to the right 99.4±0.91 mm, left 99±0.88 mm in women, right 104±0.95 mm and left 104.5±0.89 mm in men, the author's Me-Co when comparing their indicators with the Me-Co indicators of Uzbeks, only a statistically reliable difference was found compared to the Me-Co indicators of male Uzbeks (P<0.05).

The Co-Ag-Me angle of Uzbeks, which is considered the basis of mandibular morphology, is right - 121.08±0.98° and left - 122.38±1.18° in women, right - 118.33±0.66° and left - 118 in men, equal to 18±0.72°. The author's Co-Ag-Me angle parameters are right - 121.1±0.94° and left - 122.4±0.89° in women, right - 122.1±0.91° in men and left is equal to 123±0.88°. When comparing the Co-Ag-Me angle of the author with the same Co-Ag-Me angle of Uzbeks, a statistically reliable difference was found (P<0.05) compared to the Co-Ag-Me angle of male representatives of Uzbeks.

Conclusion

1. The angle of the lower jaw -Co-Ag-Me in women was 121.46±1.08 on average; in men, this indicator was equal to 118.25±0.69°. It was found that there is a difference of 3.47 degrees when comparing (P<0.05). Gender should be taken into account when analyzing mandibular cephalometric indicators.
2. When we compared the average mandibular morphological indicators of men and women of the Uzbek population, differences of 1.35 mm in the Me-Co indicator of women and 2.13 mm in So-Ag indicators were found compared to men (P<0.05). When determining Me-Co and So-Ag indicators in Uzbeks, gender dependence should be considered.
3. Comparison of mandibular morphological indicators of male and female representatives of the Uzbek population compared to the indicators proposed by the author - Grummons, 6.24 mm in the Me-Co indicator. , 6.04 mm in the Me-Ag indicator, 4.82° in the So-Ag-Me indicators (P<0.05). Therefore, it is appropriate to use the norms developed for the Uzbek population when analyzing Grummons.

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