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Facial Anthropometry and Analysis in Egyptian Women

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Background: Human facial analysis can be considered both an art and a science, and is used extensively to measure soft tissue proportions. Remarkable changes exist in anthropometric measures due to changes over centuries of geographical, genetic, and environmental factors, as well as waves of migration causing facial proportions to vary among the different ethnic groups. The purpose of this study was to establish facial soft tissue norms for the Egyptian female population between the ages of 18 and 50, as well as several age-related changes in facial measurements that are described fairly scarcely in the literature.

Methods: A prospective study was carried out on 300 Egyptian women between June 2019 and December 2020. All were volunteers and between 18 and 50 years old. Facial measurements were obtained by both direct (caliper-based) and indirect (3D Crisalix software) anthropometric analysis. Anthropometric measurements used in the study included seventeen facial measurements derived from different anthropometric soft tissue landmarks from each subject and eight measurements for analysis.

Results: Our results were able to describe the average facial and nasal measurements of the Egyptian female population, as well as the horizontal and vertical analysis of facial proportions. We also determined similarities with other Middle Eastern female measurements, with subtle differences in facial width and nasal height and width compared with Turkish and Iranian women.

Conclusions: The current study is valuable because it delivers facial anthropometric measures for Egyptian female faces. This can provide a database for a multitude of uses, including operative planning, postoperative measurements, and forensic and ergonomic purposes. *(Plast Reconstr Surg Glob Open 2022;10:e4333; doi: 10.1097/GOX.0000000000004333; Published online 18 May 2022.)*

INTRODUCTION

The notion of beauty has changed repeatedly throughout history and will continue to do so till the end of time.[1] Due to the prodigious rate of international migration in the modern world, it is important for professionals from medical and dental specialties to be aware of differences in facial characteristics among ethnic groups. This is of utmost importance for those whose work involves correction of facial anomalies or enhancing aesthetics.[2] Needless to say, it is essential to obtain an accurate facial analysis when diagnosing and preparing treatment plans for patients undergoing facial plastic surgery, orthodontic treatment, or orthognathic surgery. This is also true for diagnosis of genetic and acquired malformations, for the study of normal and abnormal growth, and for morphometric investigation.[3]

As beauty cannot be quantified and attributed, linear and angular measurements of facial proportions were thought of. Herein lies the role of anthropometry. Considered both an art and a science, it has become an indispensable measure of the soft tissue proportions of the face through objective techniques and the evaluation of craniofacial morphology. These methods are based on a series of measurements and proportions taken between landmarks defined on surface features of the head, face and ears.[4] It is essential to obtain anthropometric data for different ethnicities as human faces differ from one another based on background. This has been indicated in anthropometric studies that have shown that what are considered as normal measurements in one group should

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Fig. 1. Direct facial measurement using vernier caliper.

Takeaways

Question: What are the facial anthropometric measurements in Egyptian women and how are they affected by age?

Findings: The average facial and nasal measurements of Egyptian women, as well as the horizontal and vertical analysis of facial proportions were described by our findings. We described age-related changes as well as similarities with other Middle Eastern female measurements that were reported in the literature.

Meaning: The goal of this study was to define facial soft tissue standards for Egyptian women aged 18–50, as well as numerous age-related alterations in facial measures both of which have been published sparingly in the literature.

not be considered as normal in other ethnic groups.[5] Direct anthropometry, two-dimensional photography, and cephalometry have been the primary sources of craniofacial anthropometry previously.[6,7] More recently, however, three-dimensional (3D) technologies such laser scanning, helicoid and/or beam computerized tomography, and 3D stereophotogrammetry have become systematically used[8] due to their ability to collect data rapidly and noninvasively and compensate for the inadequacies of previously used methods.[3,4,8–10] Additionally, it is nearly impossible to conduct large studies with direct anthropometry owing to the fact that it is time-consuming and anticipated not suitable for infants and children.[11] The literature search has shown a limited number of publications relevant to the

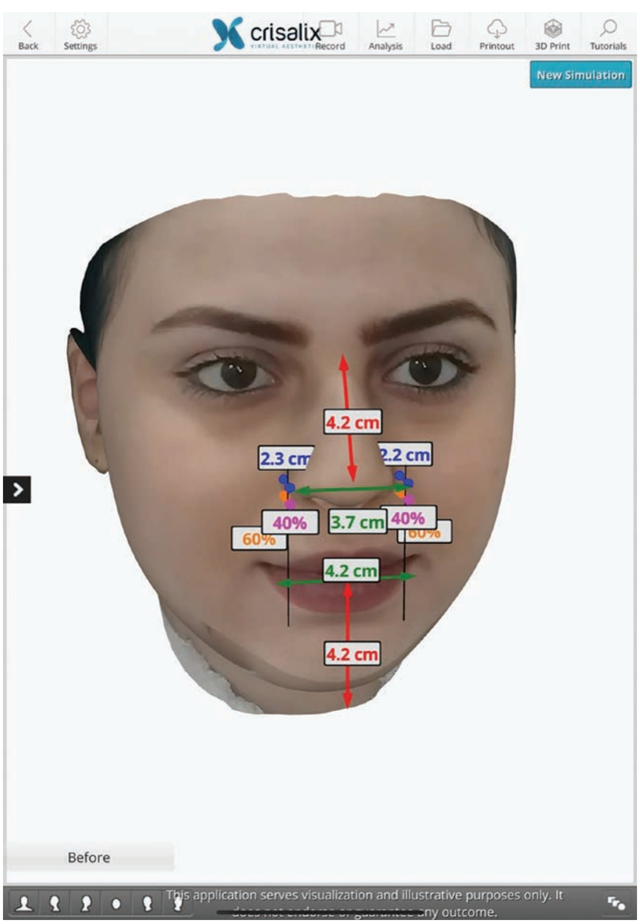

Fig. 2. Nasal and labio-oral measurements of studied women using 3D Crisalix software.

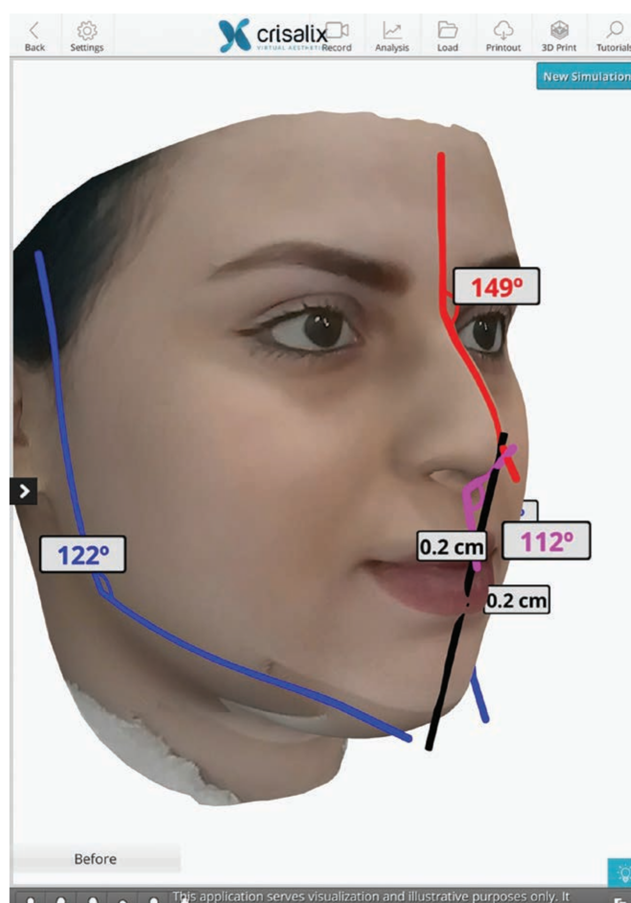

Fig. 3. Nasal and mandibular angle of studied women using 3D Crisalix software.

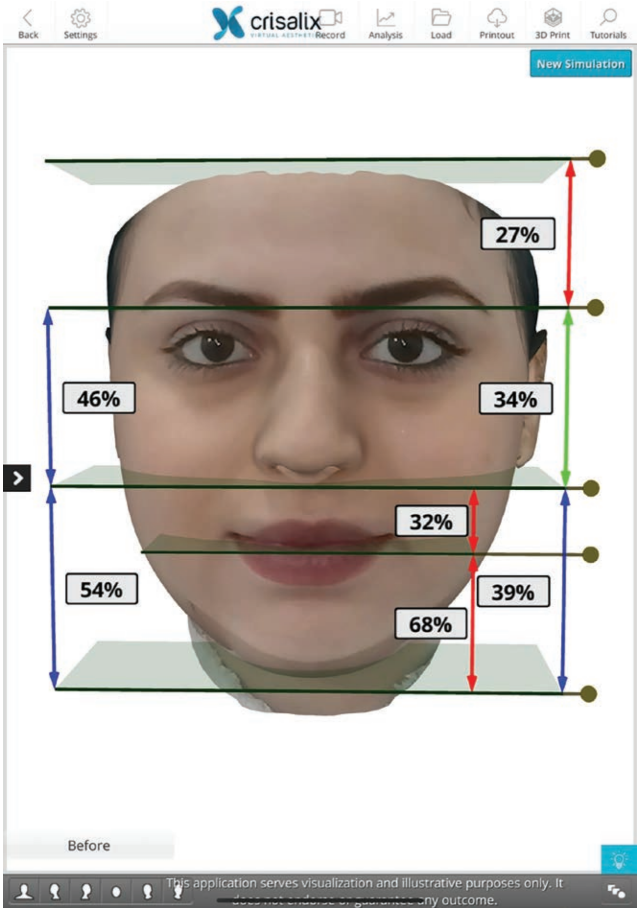

Fig. 4. Horizontal thirds proportion of studied women using 3D Crisalix software.

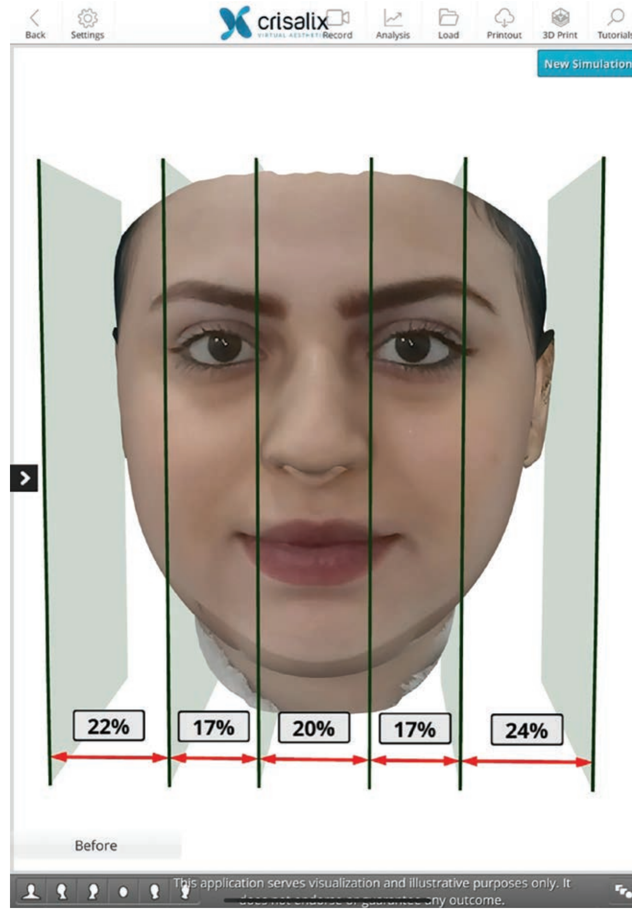

Fig. 5. Vertical fifth proportion of studied women using 3D Crisalix software.

Egyptian population. This lack of knowledge may result in practitioners unconsciously applying Western beauty standards and achieving results that do not comply with ethnically recognized facial characteristics.[12]

MATERIALS AND METHODS

After getting approval from the research ethics committee of Kasr El Eini School of Medicine, this prospective study was carried out on 300 Egyptian women between June 2019 and December 2020. All were volunteers aged between 18 and 50 years, with a mean of 29.95 ± 9.79 years. The majority of these women (114, 38%) were under 25 years old, 75 women (25%) were 25-34 years old, and 111 (37%)were 35-50 years old.

Exclusion criteria included participants with any previous facial trauma, craniofacial or prior nasal surgery, participants with congenital nose or craniofacial anomalies (such as cleft lip) that could affect the morphometry of the nose, and participants with any previous scars or facial deformities. Anthropometric measurements used in the study included 17 facial measurements derived from different anthropometric soft tissue landmarks from each subject and eight measurements for facial analysis. The study also shows age-related changes with several measurements. The direct vernier caliper was used for the following linear measurements: heights of forehead, face, lower face, ear and nose as well as width of face, lower face, intercanthal, binocular, and eye fissure. Crisalix has an option for measuring linear measurements using a ruler (by application of a start and end point), however, we believe that direct measurements may be more accurate using a caliper as determining the landmarks for start and finish may be less precise by a few millimeters when using a cursor on the image of the 3D simulator. The measurements are described as follows:

Facial measurements were obtained by both direct (caliper-based) and indirect (3D Crisalix software) anthropometric analysis (Fig. 1). Direct caliper measurements on labeled landmarks were obtained followed by linear measurements taken directly with a digital caliper on the subjects' labeled faces according to the Farkas method.[13] Special attention was given to the application of minimal pressure to avoid soft tissue deformation by the caliper during measurements.

For indirect 3D measurement, 3D facial images were obtained using Crisalix software under standard clinical lighting conditions. The system was calibrated at the beginning of each session. Photographs were taken in

Table 1. Facial Measurements Used for Anthropometry and Analysis

Facial Measurements	
tr-n	Forehead height
tr-gn	Head height
n-gn	Face height
sn-gn	Lower face height
zy-zy	Face width
go-go	Lower face width
ch-ch	Mouth width
en-en	Intercanthal width
en-ex	Eye fissure width
ex-ex	Bi-ocular width
sa-sba	Ear height
Nasal measurements	
n-sn	Nose height
al-al	Nose width
n-prn	Nasal bridge length
Angular measurements	
Nasofrontal angle	Angle between g to n and n to tip lines
Naso-labial angle	Angle between tip to sn and sn to ls lines
Mandibular angle	Angle between m point to g and g to Ar lines
Horizontal thirds proportion	
tr-g	Upper third
g-sn	Middle third
sn-gn	Lower third
Vertical fifths proportion	
paR-exR	Right outer fifth
exR-enR	Right inner fifth
enR-enL	Middle fifth
enL-exL	Left inner fifth
exL-paL	Left outer fifth

three views: frontal, right lateral, and left lateral. All photographs were taken by a mobile phone camera (GalaxyJ7 Pro SM-j730F Model) 13 megapixels, in color on a white background with sufficient and homogenous illumination and captured in JPEG format. The photographs were taken by the same researcher with the same camera and the same standardization. The volunteer stood one-and-a-half meters from the camera, and the height was adjusted individually. Volunteers were asked to stand in a fixed position and asked to gaze directly at fixed points for various views. Subjects' forehead and neck were clearly visible, with lips closed and no smile. Eyeglasses were removed with eyes fully open and equally leveled. The volunteer was asked to keep a normal and natural gaze with the camera at the level of the nose to avoid rotations. For the frontal and the profile (right and left lateral) photographs, the participant stood with the head along with the visual axis aligned parallel to the floor of the room with respect to the Frankfort plane (a line from the most superior point of the external auditory canal to most inferior point of the infraorbital rim). The images obtained were then processed using the Crisalix application to generate a 3D model of their face. The application allows for facial analysis to produce facial measurements, angles, and horizontal and vertical proportions as shown in Figures 2–5, respectively.

RESULTS

SPSS version 23.0 program (windows) was used for data processing. Continuous variables were presented as mean ± SD and compared using Student *t* test. Categorical factors were presented as frequencies and percentages, and compared using Pearson's chi-square test. SPSS tests were used to evaluate demographic data and anthropometric measurements of the studied women. *P* values less than 0.05 were considered significant.

Table 2. Facial Soft Tissue Landmarks Used for Measurement

Landmark	Name	Definition
g	*Glabella*	The most convex sagittal midline point between the eyebrows
ft	*Frontotemporale*	The point of concavity on each side of the forehead above the supraorbital rim, lateral to the elevation of the linea temporalis
zy	*Zygion*	The most lateral extents of the zygomatic arches
go	*Gonion*	The inferior aspect of the mandible at its most acute point (the mandibular angle)
sl	*Sublabiale*	The most inferior sagittal sagittal midline point of the lower cutaneous lower lip, at the labiomental sulcus
pg	*Pogonion*	The most protrusive anterior sagittal midline point of the chin
Gn	*Gnathion*	The lowest median landmark on the inferior aspect of the mandible
En	*Endocanthion*	The most medial point of the palpebral fissure, at the inner commissure of the eye
ex	*Exocanthion*	The most lateral point of the palpebral fissure, at the outer commissure of the eye
ps	*Palpebrale superius*	The most superior aspect of the palpebral fissure at the sagittal midline of the free margin of each upper eyelid
pi	*Palpebrale inferius*	The most inferior aspect of the palpebral fissure at the sagittal midline of the free margin of each lower eyelid
n	*Nasion*	The sagittal midline point of the nasal root at the nasofrontal suture
mf	*Maxillofrontale*	Lateral extents of the base of the nasal root at the junctures of the maxillofrontal and nasofrontal sutures
al	*Alare*	The most lateral extents of the alar contours
prn	*Pronasale*	The most protrusive point of the nasal tip (apex nasi), identified in lateral view
sn	*Subnasale*	The midpoint of the point of inflection of the columellar base at the juncture of its lower border with the surface of the philtrum
ls	*Labiale superius*	The sagittal midline point of the upper lip (at the upper vermilion line)
li	*Labiale inferius*	The sagittal midline point of the lower lip (at the lower vermilion line)
ch	*Cheilion*	The most lateral points at the labial commissure
sa	*Superaurale*	The most superior point of the helix of the auricle
sba	*Subaurale*	The most inferior point of the lobule of the auricle

Face width (zy-zy), mandible width (go-go), mouth width (ch-ch), right length of auricle (sa-sba), and left length of auricle (sa-sba) measurements showed an increase with increase in age of studied women ($P < 0.05$). Nasal bridge length (n-prn), right nostril width (sn-ac), and left nostril width (sn-ac) measurements also showed an increase with increased female age ($P < 0.05$). Other nasal measurements showed no increase with age ($P > 0.05$). No significance between nasal and mandibular angle measurements and age of the studied women was found ($P > 0.05$).

Table 3. Facial Anthropometric, Nasal, and Mandibular Angle Measurements of Studied Women

Measurements (mm)	(Range) Mean ± SD
Head	
Forehead height (tr-n)	(50–85) 66.74 ± 7.69
Face	
Physiognomic face height (tr-gn)	(165–205) 183.88 ± 9.72
Morphological face height (n-gn)	(103–125) 117.10 ± 4.63
Lower face height (sn-gn)	(58–77) 68.06 ± 3.41
Face width (zy-zy)	(96–140) 119.21 ± 8.15
Mandible width) go-go)	(77–129) 103.94 ± 8.90
Labio-oral	
Mouth width) ch-ch)	(37–56) 44.99 ± 4.28
Orbits	
Intercanthal width (en-en)	(26–40) 31.91 ± 2.47
Eye fissure length (en-ex)	(24–35) 30.24 ± 1.96
Bi-ocular width) ex-ex)	(77–104) 89.74 ± 5.32
Ear	
Length of the auricle (sa-sba) right	(50–71) 59.93 ± 4.09
Length of the auricle (sa-sba) left	(51–72) 59.98 ± 3.95
Nose	
Nose height (n-sn)	(40–55) 49.04 ± 3.09
Nose width (al-al)	(26–51) 39.07 ± 3.84
Nostril width (sn-ac) right	(16–24) 19.32 ± 1.61
Nostril width (sn-ac) left	(16–24) 19.41 ± 1.60
Nasal and Mandibular Angles (Degrees)	**(Range) Mean ± SD**
Nasofrontal	(133–153) 144.34 ± 4.99
Naso-labial	(102–127) 113.81 ± 5.73
Mandibular (right)	(118–127) 122.00 ± 1.76
Mandibular (left)	(117–127) 121.82 ± 1.93

Table 4. Horizontal and Vertical Thirds Proportion of Studied Women

Proportions (%)	(Range) Mean ± SD
Horizontal thirds	
Upper third (tr-g)	(25–29) 26.66 ± 0.96
Middle third (g-sn)	(31–36) 33.60 ± 1.28
Lower third (sn-gn)	(37–43) 39.74 ± 1.56
Lower facial two-third index	
Mid face	(42–50) 45.53 ± 1.76
Lower face	(45–58) 54.34 ± 1.96
Lower facial third index	
Subnasale-stomion (sn-sto)	(26–37) 32.07 ± 2.25
Stomion-gnathion (sto-gn)	(63–74) 67.93 ± 2.25
Vertical Fifth Proportion (%)	**(Range) Mean ± SD**
Right outer fifth (paR-exR)	(19–26) 22.92 ± 1.21
Right inner fifth (exR-enR)	(15–18) 16.47 ± 0.74
Middle fifth (enR-enL)	(17–25) 20.85 ± 1.35
Left inner fifth (enL-exL)	(15–18) 16.45 ± 0.71
Left outer fifth (exL-paL)	(20–27) 23.13 ± 1.23

Table 5. Face Morphology according to Facial Analysis

Facial Height/Facial Width (tr-gn/zy-zy): n (%)	
Normal (1.600–1.699)	75 (25)
Long (>1.699)	21 (7)
Short (<1.6)	204 (68)
Upper two thirds / lower third (tr-sn/sn-gn): n (%)	
Normal (1.600–1.699)	60 (20)
Long (>1.699)	150 (50)
Short (<1.6)	90 (30)
Bi-ocular width / mouth width (ex-ex/ch-ch): n (%)	
Normal (1.600–1.699)	6 (2)
Long (>1.699)	291 (97)
Short (<1.6)	3 (1)

Face morphology after facial proportion assessments analyzed in relation to the golden proportion (1.618).

There was a significant relationship between lower facial third index (sn-sto, and sto-gn) measurements and the age of the studied women ($P < 0.05$). Sn-sto measurements decrease with increased female age, whereas sto-gn measurements increase with increased female age. There was no significant relationship between vertical fifth proportions and age of the studied women ($P > 0.05$).

DISCUSSION

Only a handful of comprehensive studies have been conducted or published for the craniofacial anthropometry of the Egyptian ethnic group thus far.[13–15] Even though all humans have comparable facial features, there is a divergence in proportions and interrelations from one face to another within a group or race. Features distinguishing various ethnic groups were revealed when anthropometric methods were introduced into clinical practice to quantify changes in the craniofacial framework.[13] Racial and ethnic variances in the facial traits of Americans, Europeans, Afro-Americans, Turks, Arabs, and Chinese have been reported by several authors.[16–18] Although the differences may be small, a combination of these linear and angular measurements produces the variations seen in different population groups.

In our study, the physiognomical face height ranged from 165 to 205 mm, the morphologic face height ranged from 103 to 125 mm, the lower face height ranged from 58 to 77 mm, the face width ranged from 96 to 140 mm, the mandible width ranged from 77 to 129 mm, the mouth width ranged from 37 to 56 mm, the intercanthal distance ranged from 26 to 40 mm, the palpebral fissure length ranged from 24 to 35 mm, the bi-ocular diameter ranged from 77 to 104 mm, the ear length on right side ranged from 50 to 71 mm, and the ear length on left side ranged from 51 to 72 mm. Majeed et al studied 228 participants of Saudi-Arabian origin. They reported a forehead height of (65.0 ± 8.5) mm, which is comparable to face measurements in our study subjects.[19] Additionally, El- Kelany et al performed a cross-sectional study on 100 subjects, of which 60 were Egyptians and 40 were Bengalis. Egyptian measurements were performed at the Department of Forensic Medicine and Clinical Toxicology, Tanta University, whereas Bengali measurements were performed at Forensic Medicine Center in Hail, Ministry of Health, Saudi Arabia. They reported measurements similar to ours in regard to facial breadth and facial length among Egyptian female subjects. These measurements were comparable to those of Saudi females but significantly differed when compared with Bengali parameters. The previous finding may be due to Saudi-Arabian ethnic groups belonging to the Middle Eastern region and therefore sharing somewhat similar features.[15] Hegazy conducted a study on a total of 290 healthy Egyptian volunteer subjects (144 men and 146 women) who were inhabitants of Sharkia governorate and East Delta region of Egypt. Nasal height and width were measured using a vernier caliper and used to determine the nasal index. His study showed results similar to our findings in regard to nose height; however, nasal width and index differed, leading to a conclusion of a leptorrhine, which contradicts our findings of a nose lying between

Table 6. Facial and Nasal Anthropometric, Nasal and Mandibular Angle Measurements according to Age Ranges of the Studied Women

	(Range) Mean ± SD			
Measurements (mm)	**18–24 years**	**25–34 years**	**35–50 years**	***P***
tr-n	(50–85) 66.74 ± 8.57	(52–79) 65.42 ± 7.11	(55–82) 67.65 ± 1.11	0.281
tr-gn	(165–205) 183.95 ± 10.55	(167–198) 183.04 ± 8.66	(165–204) 184.35 ± 9.67	0.851
n-gn	(103–125) 117.18 ± 4.63	(104–123) 117.50 ± 4.29	(105–123) 116.70 ± 4.89	0.596
sn-gn	(58–74) 68.11 ± 3.53	(61–76) 68.40 ± 3.34	(60–77) 67.81 ± 3.37	0.662
zy-zy	(105–132) 116.66 ± 5.59	(108–138) 120.33 ± 7.64	(96–140) 120.92 ± 9.96	0.001*
go-go	(83–127) 102.05 ± 8.18	(90–119) 104.33 ± 7.41	(77–129) 105.35 ± 10.13	0.007*
ch-ch	(37–55) 44.53 ± 4.29	(38–54) 44.92 ± 4.16	(38–56) 45.54 ± 4.27	0.013*
en-en	(27–37) 31.76 ± 2.34	(28–40) 32.21 ± 2.92	(26–36) 31.91 ± 2.30	0.548
en-ex	(26–34) 30.47 ± 1.93	(24–35) 30.21 ± 2.15	(25–34) 30.03 ± 1.89	0.398
ex-ex	(77–100) 89.50 ± 4.76	(77–104) 90.37 ± 5.83	(78–104) 89.57 ± 5.60	0.711
sa-sba (right)	(50–70) 58.84 ± 3.53	(54–70) 59.83 ± 3.95	(53–71) 60.92 ± 4.35	0.001*
sa-sba (left)	(51–70) 58.89 ± 3.70	(54–70) 59.96 ± 3.81	(51–72) 59.98 ± 4.04	0.001*
Nasal measurements (mm)				
n-sn	(42–55) 49.08 ± 3.21	(43–53) 49.13 ± 2.83	(40–54) 48.86 ± 3.15	0.367
al-al	(26–51) 38.87 ± 4.81	(34–47) 39.67 ± 3.39	(33–47) 38.78 ± 2.83	0.121
n-prn	(37–53) 43.82 ± 3.36	(36–56) 44.68 ± 4.67	(40–53) 45.58 ± 3.13	0.025*
sn-ac (right)	(16–22) 19.13 ± 1.49	(16–24) 19.22 ± 1.76	(17–23) 19.71 ± 1.49	0.023*
sn-ac (left)	(16–22) 19.24 ± 1.35	(16–24) 19.11 ± 1.68	(18–24) 20.08 ± 1.66	0.001*
Nasal and mandibular angles (degrees)				
Nasofrontal	(133–152) 144.00 ± 4.91	(133–153) 143.92 ± 5.22	(133–153) 144.84 ± 4.94	0.191
Nasolabial	(104–127) 114.82 ± 5.10	(104–123) 113.42 ± 5.38	(102–127) 113.30 ± 6.31	0.113
Mandibular (right)	(118–126) 122.13 ± 1.81	(120–127) 122.21 ± 1.42	(118–126) 121.70 ± 1.91	0.126
Mandibular (left)	(117–127) 121.95 ± 1.42	(118–126) 121.83 ± 1.87	(117–126) 121.68 ± 2.10	0.769

*Indicates a statistically significant *P* value.

Table 7. Horizontal and Vertical Thirds Proportion according to Age of the Studied Women

	(Range) Mean ± SD			
Proportions (%)	**18–24 years**	**25–34 years**	**35–50 years**	***P***
Horizontal thirds				
Upper third (tr-g)	(25–29) 26.71 ± 0.91	(25–28) 26.88 ± 0.93	(25–29) 26.49 ± 1.01	0.330
Middle third (g-sn)	(31–36) 33.50 ± 1.45	(32–36) 33.62 ± 1.04	(31–36) 33.70 ± 1.25	0.556
Lower third (sn-gn)	(37–42) 39.76 ± 1.58	(37–42) 39.54 ± 1.53	(37–43) 39.81 ± 1.58	0.344
Lower facial two third index				
Mid face	(42–50) 45.29 ± 1.81	(43–49) 45.67 ± 1.50	(42–50) 45.70 ± 1.88	0.276
Lower face	(42–58) 54.37 ± 2.32	(52–57) 54.33 ± 1.50	(50–58) 54.30 ± 1.88	0.938
Lower facial third index				
sn-sto	(28–36) 32.37 ± 2.19	(29–37) 32.04 ± 2.06	(27–36) 31.95 ± 2.22	0.001*
sto-gn	(64–72) 67.63 ± 2.19	(63–71) 67.96 ± 2.06	(64–73) 68.05 ± 2.22	0.001*
Vertical fifth proportion (%)				
paR-exR	(21–24) 22.68 ± 0.86	(21–26) 23.33 ± 1.25	(19–25) 22.89 ± 1.43	0.151
exR-enR	(16–18) 16.53 ± 0.59	(15–17) 16.29 ± 0.68	(15–18) 16.51 ± 0.89	0.081
enR-enL	(18–24) 20.74 ± 1.19	(17–23) 20.67 ± 1.35	(19–25) 21.08 ± 1.50	0.145
enL-exL	(16–18) 16.55 ± 0.55	(15–17) 16.25 ± 0.59	(15–18) 16.49 ± 0.89	0.083
exL-paL	(20–25) 23.21 ± 1.20	(22–27) 23.33 ± 1.18	(20–26) 22.92 ± 1.28	0.125

*Indicates a statistically significant *P* value.

Table 8. Facial Analysis and Age of Studied Women

	n (%)			
Proportions (%)	**18–24 years**	**25–34 years**	**35–50 years**	***P***
Facial height/facial width (tr-gn/zy-zy)				
Normal (1.600–1.699)	30 (7)	18 (7)	27 (7)	0.065
Long (>1.699)	15 (7)	3 (7)	3 (7)	
Short (<1.6)	69 (7)	51 (7)	81 (7)	
Upper two-thirds/lower third (tr-sn/sn-gn)				
Normal (1.600–1.699)	24 (7)	12 (7)	57 (7)	0.565
Long (>1.699)	54 (7)	35 (7)	24 (7)	
Short (<1.6)	36 (7)	25 (7)	30 (7)	
Bi-ocular width/mouth width (ex-ex/ch-ch)				
Normal (1.600–1.699)	3 (7)	3 (7)	0 (0)	0.156
Long (>1.699)	111 (7)	69 (7)	108 (7)	
Short (<1.6)	0 (0)	0 (0)	3 (7)	

There was no significant relationship between facial analysis and the age of studied women ($P > 0.05$).

mesorhine and palatarhine. This difference may be due to his study being limited to the delta region[14] (Tables 1–8).

CONCLUSIONS

The value of the current study lies in that it provides facial anthropometric norms of the female Egyptian face. This can be used as a reference and database during the diagnosis and treatment planning of patients undergoing plastic, orthodontic, and maxillofacial surgery, thus improving the posttreatment results. This database could also be used for forensic purposes, genetics (early diagnosis of congenital anomalies), and ergonomic product design industry and face recognition technology. In our opinion based on our current study, 3D technologies have shown to be effective, sensitive, fast, and accurate tools, which can be of value when implemented in anthropometry and plastic surgery.

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PATIENT CONSENT

The patient provided written consent for the use of her images.

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