

Segmental facial morphometrics and gender differences in Gujarati Population.

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Abstract:

Background & Aim: Facial measurements are affected by various factors in different ethnic groups. Very little or no data available on upper and lower segment of face in Gujarati population. So the aim was to prepare data of upper and lower facial segment measurements in Gujarati population and find out gender variations if any. **Material and Methods:** 300 living subjects were measured for Forehead height (trichion-glabella, tr-gl), Upper face width (zygion-zygion, zy-zy), Upper face depth (tragion – nasion, t-n), Lower face height (subnasale- gnathion, sn-gn), Lower face width, gonion-gonion, go-go), Lower face depth (tragion-gnathion, t-gn). **Result:** Mean values of forehead height (tr-gl), Upper face width (zy-zy), Upper face depth (t-n), Lower face height (sn-gn), Lower face width (go-go) and Lower face depth (t-gn) were 49.49±10.43mm, 123.07±9.5mm, 115.46±6.95, 58.56±10.18, 104.37±16.32 and 130.36±9.08 in males and 46.4±9.67, 117.25±8.99, 112.43±5.89, 54.4±10.26, 103.93±19.12 and 125.38±7.37 in females respectively. Out of these, significant difference between male and female was found for Forehead and lower face heights. **Conclusion:** Data obtained from this study may be helpful in manufacturing face masks, face identification devices, facial reconstruction surgeries and diagnosis in orthodontics.

Key words: Facial morphometrics, Lower face, Upper face.

Introduction:

Facial measurements differ significantly in various ethnic groups¹. These differences could be largely due to geographical, racial, nutritional, biological and ecological factors²⁻⁴. Differences of the size and relationship between facial components may increase with the age between male and female. Differences in specific parts of craniofacial skeleton between male and female may begin to develop strikingly at puberty and those differences may help orthodontists in diagnosis⁵. Various face measurements are required for manufacturing of face masks, face identification devices, facial reconstruction surgeries etc.

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Morphometry can play a vital role in identifying pure race from locally mingled race. Face is involved in many syndromes of dysmorphogenesis. Techniques used in previous studies on craniofacial anthropometry were mostly using skulls and 2D or 3D imaging⁶. But cadaveric materials may have many shortcomings and imaging may not suit for surface measurements because of poor resolution, high cost and exposure to ionizing radiation. As the soft tissues overlying bones can vary, skull measurements become inadequate to evaluate the face⁷. As very little studies carried out measuring the soft tissue data of face in Gujarat, we conducted this study establishing normative data on facial measurements.

Material and methods:

The present study was carried out in Gujarat on a total 300 living subjects out of which, 150 were female and 150 were male. Selected subjects were between 17-23 years of age having both the parents of Gujarati descent and without any craniofacial abnormalities, trauma or history of plastic/reconstructive surgery. Approval of institutional review board was obtained and informed consent was taken. To take the measurements, subject's head was kept in Frankfurt's horizontal plane; soft tissue landmarks were identified and marked by non-permanent marker pen. Distance between marked landmarks was measured by digital vernier caliper. Following measurements were taken: Forehead height (trichion-glabella, tr-gl), Upper face width (zygion-zygion, zy-zy), Upper face depth (tragion – nasion, t-n), Lower face height (subnasale- gnathion, sn-gn), Lower face width, gonion-gonion, go-go), Lower face depth (tragion-gnathion, t-gn). For upper and lower facial depth measurements, we only measured on right side as there was no statistically significant difference between right and left sides of measurements. The collected data was tabulated and analyzed, following results were obtained.

Image: 1 Measurements of upper facial segment



Image: 2 Measurements of lower facial segment



Results:

In this study, mean values of all the parameters were higher in male compared to the female. We found statistically significant difference between male and female with respect to forehead and lower face height where as remaining parameters showed no statistically significant difference between male & female subjects (Table – 1&2)

Table 1: Craniofacial measurements and T test for upper face segment

| Sr. No. | Parameter | Gender | Minimum (mm) | Maximum (mm) | Mean (mm) | SD (mm) | P value |
|---------|--------------------------|--------|--------------|--------------|-----------|---------|---------|
| 1 | Forehead Height (tr-gl) | Male | 33.22 | 72.67 | 49.49 | 10.43 | 0.0084 |
| | | Female | 31.22 | 69.2 | 46.4 | 9.67 | |
| 2 | Upper face Width (zy-zy) | Male | 108.6 | 143.96 | 123.07 | 9.5 | 1.5809 |
| | | Female | 104.91 | 138.6 | 117.25 | 8.99 | |
| 3 | Upper face Depth (t-n) | Male | 104.67 | 130.22 | 115.46 | 6.95 | 6.1415 |
| | | Female | 101.62 | 125.2 | 112.43 | 5.89 | |

If P < 0.05, difference is significant between male & female subjects.

Table 2: Craniofacial measurements and T test for lower face segment

| Sr. No. | Parameter | Gender | Minimum (mm) | Maximum (mm) | Mean (mm) | SD (mm) | P value |
|---------|---------------------------|--------|--------------|--------------|-----------|---------|---------|
| 1 | Lower face Height (sn-gn) | Male | 42.44 | 78.46 | 58.56 | 10.18 | 0.0005 |
| | | Female | 41.2 | 74.6 | 54.4 | 10.26 | |
| 2 | Lower face Width (go-go) | Male | 82.92 | 142.77 | 104.37 | 16.32 | 0.8339 |
| | | Female | 78.42 | 138.9 | 103.93 | 19.12 | |
| 3 | Lower face Depth (t-gn) | Male | 116.08 | 148.11 | 130.36 | 9.08 | 3.8304 |
| | | Female | 113.2 | 143.55 | 125.38 | 7.37 | |

If P < 0.05, difference is significant between male & female subjects.

Discussion:

Cranio-facial anthropometric measurements are required in various specialities like plastic surgeries, maxillofacial surgeries and dentistry, esthetic surgeries, genetics, forensic medicine, anatomy, anthropometry etc. Results of this study can be utilized in diagnosis and conducting plastic reconstructive surgeries and orthodontic surgeries in Gujarat. Mean values of forehead height (tr-gl), Upper face width (zy-zy), Upper face depth (t-n), Lower face height (sn-gn), Lower face width (go-go) and Lower face depth (t-gn) were 49.49 ± 10.43 mm, 123.07 ± 9.5 mm, 115.46 ± 6.95 , 58.56 ± 10.18 , 104.37 ± 16.32 and 130.36 ± 9.08 in males and 46.4 ± 9.67 , 117.25 ± 8.99 , 112.43 ± 5.89 , 54.4 ± 10.26 , 103.93 ± 19.12 and 125.38 ± 7.37 in females respectively. In a study conducted in Turkish adults, these values were 52.72 ± 9.6 , 129.06 ± 7 , 126.7 ± 5.1 , 70.54 ± 5.5 , 111.55 ± 9.2 and 147.32 ± 5.8 in males and 51.29 ± 7.5 , 127.2 ± 6.5 , 118.17 ± 4.2 , 63.44 ± 5.8 , 107.43 ± 8.7 and 135.63 ± 6.5 in females respectively⁸. Mean values were higher in Turkish adults compared to gujarati adults. In our study, statistical significant difference between male and female was found for parameters tr-gl and sn-gn where as in Turkish adults, all the parameters had statistical significant difference except tr-gl and go-go. In north American white young adult population, mean values of zy-zy, sn-gn and go-go were 137.1, 71.9 and 97.1 in males and 129.9, 65.5 and 91.1 in females respectively which indicates that only value of lower face width is higher in gujarati population compared to north American white adult young population⁹. In Chinese young

adults, mean values of upper and lower face depth were 122.44 ± 4.02 and 146.79 ± 5.48 in males and 113.01 ± 3.7 and 135.68 ± 5.63 in females respectively which were higher compared to our study¹⁰. In contrast to our study, upper face depth was higher in Chinese female compared to male where as with regard to lower face depth, there was no significant difference between male and female.

Associations have been found between facial morphology and personality features and we can draw valid inferences about personality characteristics from face¹¹. With the availability of facial anthropometric measurements, we can establish standardized norms to enhance facial attractiveness¹².

Conclusion:

In our study, we measured various upper and lower facial parameters of 300 gujarati people and compared with various races and ethnic groups. As there was a difference between measurements of various races and ethnic groups, their measurements were not useful for gujarati population. We attempted to establish a normogram on upper and lower face height, width and depth of gujarati population which is essential in planning a surgery and post operative evaluation.

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