INTRODUCTION

When dealing with skeleton or its remains; race, sex and age are the three most vital determinations to be made out. They are best determined from skull both morphometrically and morphologically. Craniodimetric indices are commonly used as reliable sexual dimorphic traits. These indices give fairly accurate and simplest way for judging similarities or disparities when comparing different races. They are expressed as percentages or ratios which is important for classification of cranial type and also for studying living population. Some studies done comparing South and north Indian population craniodimetric indices but Western Indian population is yet neglected having few data available on these. As this method is highly population specific, should be customized in reference to population. Facial contours are highly attentive and interesting topic for artists, anthropologist, anatomist, forensic scientists, and maxillofacial surgeons. Since ancient time human face measurements are in practice to determine various shapes. Measurements of facial skeleton play crucial role for identifying skeletal variations and determining population history. Many factors affect the shape of face like race, sex, climate, genetic, socio economic and nutritional factors. Less studies available on upper facial index from skull worldwide and not all suggestive of significant sexual dimorphism. The purpose of this study to verify significance of sexual dimorphism by upper facial index and to determine dominant facial type in Western Indian population.

MATERIALS AND METHODS: The study was conducted on 80 crania of known sex. Upper facial height and bizygomatic breadth were measured and upper facial index was calculated. Result: In the present study the mean upper facial index is found to be 50.5 + 3.6mm. Mean upper facial index is observed as 49.9mm in males and 51.3mm in females. The difference in upper facial index of male and female crania is statistically insignificant indicating less sexual dimorphism. Dominant facial type is mesene (round face) category for both male and female crania. Conclusion: Present study verified and confirmed that upper facial height and bizygomatic breadth show statistically significant difference for sex determination of adult crania while upper facial index is statistically insignificant indicating less sexual dimorphism suggestive to use other methods for sex determination of adult crania. Mesene type is the dominant facial type (56%) found in western Indian population. This study will serve as a future framework for estimating other cranial variables in same population.
determine dominant facial type in Western Indian population which will add into literature data.

**MATERIALS AND METHODS**

The study was conducted on 80 (40 males and 40 females) dry, well preserved and intact adult crania obtained from anatomy departments of medical colleges across Gujarat. All crania were assumed to be from West Indian origin. Two parameters were measured based on methods as per international standards.[11,22,23] Points are marked by marker pen, distance is measured thrice in millimeters and average is counted for each measurement on every skull for reducing intra observer error.

- **Upper facial height:** Distance measured from nasion to prosthion by vernier caliper
- **Bizygomatic breadth:** Distance measured between two zygia (most laterally placed points on zygomatic bone) by spreading caliper.

The measurements were tabulated in excel program. Mean and standard deviation for each parameter were calculated. Z test is applied as the sample size is more than 30 and statistical significance is checked by p value.

**The upper facial index was calculated as follow**

\[
\text{Upper Facial Index} = \frac{\text{Upper facial height} \times 100}{\text{Bizygomatic breadth}}
\]

**Classification of facial types based on upper facial index (Martin and Sellar),[24]**

a) Hypereuryene (very broad face) ≤ 44.9
b) Euryene (broad face) 45–49.9
c) Mesene (round face) 50–54.9
d) Leptene (long face) 55–59.9
e) Hyperleptene (very long face) ≥ 60

**RESULTS**

The results of cranial parameters used for this study are shown in [Table 1]. The mean of upper facial height and bizygomatic breadth are 62.2mm and 123.4mm respectively for total sample. Both these parameters are statistically significant. The mean upper facial index for male and female crania are 49.9 mm and 51.3 mm respectively. The mean upper facial index for total sample is 50.5mm. Mean of female crania show higher value than mean of male crania for upper facial index. Differences of male and female upper facial index is statistically insignificant (p>0.05). Table 2 shows facial types identified based on upper facial index in the present study. According to classification, 04 (05%) crania were grouped as Hypereuryene (very broad face), 25 (31%) as euryene (broad face), 45 (56%) as mesene (round face) and 06 (08%) as leptene (long face) from total sample.

**Table 1: Mean and standard deviation values of parameters: (All measurements are in mm.)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Male (n= 46)</th>
<th>Female (n= 34)</th>
<th>Total (n= 80)</th>
<th>Z test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper facial height</td>
<td>Mean 63.4</td>
<td>Mean 60.6</td>
<td>Mean 62.2</td>
<td>2.7</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Bizygomatic breadth</td>
<td>SD 4.8</td>
<td>SD 4.3</td>
<td>SD 4.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper facial index</td>
<td>Mean 49.9</td>
<td>Mean 51.3</td>
<td>Mean 50.5</td>
<td>1.7</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td></td>
<td>SD 3.1</td>
<td>SD 4.0</td>
<td>SD 3.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2: Classification of Facial types based on upper facial index.**

<table>
<thead>
<tr>
<th>Facial type</th>
<th>Range of upper facial index</th>
<th>Male crania (46)</th>
<th>Female crania (34)</th>
<th>Total sample (80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypereuryene (very broad face)</td>
<td>≤ 44.9</td>
<td>02 (04%)</td>
<td>02 (06%)</td>
<td>04 (05%)</td>
</tr>
<tr>
<td>Euryene (broad face)</td>
<td>45 – 49.9</td>
<td>16 (35%)</td>
<td>09 (26%)</td>
<td>25 (31%)</td>
</tr>
<tr>
<td>Mesene (round face)</td>
<td>50 – 54.9</td>
<td>27 (59%)</td>
<td>18 (53%)</td>
<td>45 (56%)</td>
</tr>
<tr>
<td>Leptene (long face)</td>
<td>55 – 59.9</td>
<td>01 (2%)</td>
<td>05 (15%)</td>
<td>06 (18%)</td>
</tr>
<tr>
<td>Hyperleptene (very long face)</td>
<td>≥ 60</td>
<td>00 (00%)</td>
<td>00 (00%)</td>
<td>00 (00%)</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Present study confirms sexual dimorphism in upper facial index is statistically insignificant (p>0.05) and classification of index suggest mesene type as dominant facial type in western Indian population followed by euryene in both sex. If we compare our study with similar studies in India, Raghavan P et al,[24] measured over 1300 crania across India and calculated 17 indices. In every series except Urdu, upper facial index ranges from hypereuryene to leptene type which involves wide range of classification. Dattatray DA and Ankushrao DS,[25] concluded this index as statistically significant and revealed that out of 100 Indian skulls studied, most of skulls fall in euryene (broad face) group with few male skulls in mesene group and few female skulls in hypereuryene group while Chaturvedi RP and Herneja NK,[26] observed that mean of upper facial index is 52.99 which falls in mesene group in their study of for 150 skulls. North Indian population have mesene type face as per study by Saini V et al,[14] on total 483 skulls; Vaidya YP et al,[27] observed that Central Indian population fall in mesene type of group in their study on 30 crania which show mean of this index is 52.28. Padala SR and Khan N,[28] found 44% mesene type followed by 24% as hyperleptene type face however the difference was not statistically significant indicating less sexual dimorphism for 50 skulls of South Indian origin. Another Study by
CONCLUSION

Present study verified and confirmed that upper facial height and bizygomatic breadth show statistically significant difference for sex determination of adult crania while upper facial index is statistically insignificant indicating less sexual dimorphism suggestive to use other methods for sex determination of adult crania. Mesene type is the dominant facial type (56%) found in western Indian population followed by euryene type of face (31%) in both sex. The result of this study will be useful in anthropology, forensic medicine and surgery. This study will serve as a future framework for estimating other cranial variables in same population.

REFERENCES


