

## To Derive Identification Point Of Facial Parameters And Stature- An Anthropometric Study

Dr. Vaishali A. Mane<sup>1</sup>, Dr. Supriya Satpute<sup>2</sup>, Dr. A.Y.Mane<sup>3</sup>

<sup>1,2</sup>Assistant Professor, <sup>3</sup>Professor,

<sup>1,2</sup>Department of Anatomy, <sup>3</sup>Department of Biochemistry

<sup>1,3</sup>Prakash Institute of Medical Sciences and Research, Urun Islampur

<sup>2</sup>Sir Aurbindo Medical College and hospital, Indore

**\*Corresponding Author:**

**Dr. Vaishali A. Mane**

Assistant Professor in Anatomy.Prakash Institute of Medical Sciences and Research,  
Urun-Islampur,Sangli district, Maharashtra

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### Abstract

The science of comparative racial anthropometry has shown that there are consistent differences in the body proportions of various human races. Each race has different gene pools and even genetically different subgroups that exhibit different behaviors, characteristics and peculiarities. To measure the stature of an individual. To measure the facial parameters (total facial height, upper facial height, lower facial height, nasal height, nasal width, bizygomatic width) of the same individual. To calculate Demarcation point from Identification point for each parameter. A total of 799 subjects belonged to study group. 409 males and 390 females for Sangli District participated in the study. Religion wise 542 Hindu, 257 Muslim. The procedure was explained to the subjects. Identification of males of Sangli district population height > 172.2cm, Lower Facial Height (LFH) > 6.62 cm and Upper Facial Height (UFH) > 6.6 cm observed to be the best parameters. For identification of females of Sangli district population, LFH < 3.58 cm, UFH < 4.38 cm and Height < 146.87 cm found to be the best parameters.

**Keywords:** NIL

### Introduction

Anthropometry is concerned with measurement of physical sizes and shapes of human body.<sup>1</sup> Anthropometry is derived from the Greek word anthropos means man, metry means to measure, thus anthropometry is a science that correlated with the measurement of size, weight and proportions of human body. It was developed by a German Anatomist, Johanne Sigismund Elsho for his doctoral thesis at the University of Padua in 1654.<sup>2</sup>

There are inter-racial and inter-geographical differences in measurements & their correlations with stature. What may be true for one race or one region

may not be true for other.<sup>3</sup> There are very few studies and references available on facial parameters in India.

Anthropometric studies play an important role in distinguishing a pure race from the local mingling of races.<sup>4</sup> Facial anthropometric studies involving facial height have far-reaching implications in health-related fields.<sup>5,6</sup> The science of comparative racial anthropometry has shown that there are consistent differences in the body proportions of various human races.<sup>7</sup> Each race has different gene pools and even genetically different subgroups that exhibit different behaviours, characteristics and peculiarities.<sup>8</sup>

In the past, facial anthropometry has been successfully utilized for forensic purposes by some scientists.<sup>9,10</sup> However, only a few studies have been conducted on facial height proportions in different communities.<sup>11,12</sup>

The climate and dietary habits of the people of different regions of India are variable.

### **Aim And Objectives**

1. To measure the stature of an individual.
2. To measure the facial parameters (total facial height, upper facial height, lower facial height, nasal height, nasal width, bizygomatic width) of the same individual.
3. To calculate Demarcation point from Identification point for each parameter.

### **Material And Methods-**

#### **Type Of Study:**

Cross sectional, comparative study.

#### **Sample Size:**

A total of 799 subjects included for the study.

#### **Inclusion Criteria:**

Adult individuals both male and female belonging to the age group above 18 years in Sangli district from Hindu, Muslim and Christian religions, native of Sangli district.

#### **Exclusion Criteria:**

Individuals having congenital facial deformity/stature anomaly/undergone any facial surgery, deformed face.

#### **Methodology:**

1. After IEC approval and written informed consent was taken from participants included in the study.
2. A total of 799 subjects belonged to study group. 409 males and 390 females for Sangli District participated in the study. Religion wise 542 Hindu, 257 Muslim.
3. The procedure was explained to the subjects.
4. Following anthropometric measurements were taken with reference to following anthropometric landmarks.
  1. Stature/Body height

2. Total Facial Height -TFH
3. Upper Facial Height-UFH
4. Lower Facial Height-LFH
5. Nasal Height-NH
6. Nasal Width-NW
7. Total facial /Bizygomatic Width-BZW

#### **Various Anthropometric Landmarks:**

1. Zygion (zy): most lateral point of the zygomatic arch
2. Gonion (go): most lateral point on the angle of mandible
3. Nasion (n): meeting point of nasal root and the nasofrontal suture.
4. Subnasale (sn): midpoint of the columella where philtrum of upper lip meet.
5. Gnathion (gn): midpoint of mandible protuberance.
6. Prosthion: A point on upper alveolar arch midway between the median upper incisor teeth.

#### **ANTHROPOMETRIC MEASUREMENTS**

**Stature/Height:** The height of individual was measured in standing position, from heel to the highest point of scalp by standard flexible steel tape in cm. Fig no 4.5.2.

For facial measurements subjects were asked to sit in an upright relaxed position and made to look at a distant object. Following facial measurements were taken with digital venire calliper.

1. Total facial height: It is from nasion to gnathion in mm.
2. Upper facial height- It is from nasion to prosthion in mm
3. Lower facial height- It is from prosthion to gnathion in mm.
4. Nasal aperture height- It is from nasion to the subnasale in mm.
5. Nasal aperture width- It is maximum transverse distance between right & left margins of the nasal aperture in mm.
6. Total facial breadth/Bizygomatic width- It is transverse width between the right & left zygomatic arches in mm.

#### **Observations And Results**

All facial parameters were converted mm to cm. Data were coded and entered into excel sheet which was later analyzed using Statistical Package for the Social Sciences version 22.0 (SPSS; SPSS Inc. IBM,

Delaware). SPSS is software package used for statistical analysis. Descriptive statistics, i.e., mean, SD, and range, were calculated for all the variables.

**Table 1: Descriptive statistics of Height and Facial parameters amongst Sangli District population: (n=799, M=409, F=390).**

FP	Sex	Mean	SD	SEE	Min	Max	P value
TFH	M	11.05	0.71	0.031	8.95	12.96	<0.001
	F	10.03	0.70	0.031	7.67	13.13	
UFH	M	<b>5.70</b>	<b>0.44</b>	<b>0.020</b>	<b>4.16</b>	<b>7.12</b>	<0.001
	F	<b>5.22</b>	<b>0.46</b>	<b>0.021</b>	<b>3.63</b>	<b>6.73</b>	
LFH	M	<b>5.35</b>	<b>0.59</b>	<b>0.026</b>	<b>3.48</b>	<b>7.37</b>	<0.001
	F	<b>4.79</b>	<b>0.61</b>	<b>0.027</b>	<b>2.20</b>	<b>7.97</b>	
NH	M	4.76	0.41	0.018	1.58	5.77	<0.001
	F	4.49	0.46	0.021	1.55	4.96	
NW	M	3.63	0.34	0.015	2.38	4.54	<0.001
	F	3.32	0.37	0.016	1.33	4.96	
BZW	M	11.84	0.73	0.033	9.59	13.90	<0.001
	F	11.49	0.71	0.032	9.21	13.89	
Ht	M	<b>167.54</b>	<b>6.89</b>	<b>0.305</b>	<b>144</b>	<b>185</b>	<0.001
	F	<b>153.01</b>	<b>6.41</b>	<b>0.289</b>	<b>133</b>	<b>173</b>	

(\*P<0.001; highly statistically significant)

Table 1 outlines that height and all facial parameters are greater in males than in females of Sangli district population.

A statistically significant difference is seen in all the parameters. For sexual dimorphism, identification point for each parameter was calculated from the range of each measurement. From this percentage of identified persons was calculated. The calculated range is obtained by (mean±3S.D) to check the accuracy of data collected. Demarking points were worked out from calculated range. By applying demarking point for each parameter, percentage of identified males and females was recorded.

**Table 2: To calculate Demarcation point from Identification point for each parameter amongst Sangli District population.**

FP	Sex	Identification point	% of IP	Calculating Range	Demarcation Point	% D.P.
TFH	M	>13.13	0	8.92 -13.18	> 12.13	1.1
	F	<8.95	1.3	7.93 -12.13	< 8.92	1.3

<b>UFH</b>	M	> 6.73	1.5	4.38 – 7.02	> 6.6	2.1
	F	< 4.16	1.1	3.84 – 6.6	< 4.38	3.1
<b>LFH</b>	M	> 7.97	0	3.58 – 7.12	> 6.62	2.1
	F	< 3.48	1.2	2.96 – 6.62	< 3.58	3.3
<b>NH</b>	M	> 4.96	1.6	3.53 – 5.99	> 5.87	0.9
	F	< 1.58	0.5	3.11 – 5.87	< 3.53	1.3
<b>NW</b>	M	> 4.96	0	2.61 – 4.65	> 4.43	1.8
	F	< 2.38	1.9	2.21 – 4.43	< 2.61	1.7
<b>BZW</b>	M	> 13.89	0.3	9.65 – 14.03	> 13.62	1.9
	F	< 9.59	1.4	9.36 – 13.62	< 9.65	1.2
<b>Ht</b>	M	> 173	2.2	146.87-188.21	> 172.24	3.1
	F	< 144	3.2	133.78 – 172.24	<146.87	2.3

**Table 3: Comparison of mean value of Stature, Total facial height, Upper facial height, lower facial height with previous studies**

<b>FP</b>	<b>TFH</b>		<b>UFH</b>		<b>LFH</b>		<b>Ht</b>	
	M	F	M	F	M	F	M	F
Ajeet Jaiswal-2014	5.72	5.54	-	-	-	-	165.66	151.04
Twisha-2015	9.85	8.54	-	-	-	-	164.3	150.56
Swami-2015	11.07	10.21	-	-	-	-	168.71	155.18
Pokharel-2018	12.14	11.53	-	-	-	-	167.42	155.99
Hatwal-2009	-	-	-	-	5.73	5.48	-	-
O Ebeye-2015	12.61	11.91	-	-	6.75	6.36	-	-
Prassanna-2014	-	-	7.21	6.56	-	-	-	-
N. Indian	-	-	-	-	-	-	-	-
S Indian	-	-	5.70	5.22	-	-	-	-
<b>Present study</b>	<b>11.05</b>	<b>10.03</b>	<b>5.70</b>	<b>5.22</b>	<b>5.35</b>	<b>4.79</b>	<b>167.54</b>	<b>153.01</b>

**Table 4: Comparison of mean value of Nasal height, Nasal width, Bizygomatic width with previous studies**

<b>FP</b>	<b>NH</b>		<b>NW</b>		<b>BZW</b>	
	M	F	M	F	M	F

O Ebeye-2015	4.56	4.27	-	-	-	-
<b>Sheetal sagar-2014</b>	4.77	4.88	3.9	3.75	-	-
<b>Sudhakar ray-2016</b>	3.87	3.47	2.87	2.49	-	-
Twisha-2015	-	-	-	-	<b>13.07</b>	<b>11.47</b>
Pokharel-2018	-	-	-	-	<b>12.04</b>	<b>11.36</b>
<b>Present study</b>	<b>4.76</b>	<b>4.49</b>	<b>3.63</b>	<b>3.32</b>	<b>11.84</b>	<b>11.49</b>

Amongst all above parameters studied, height > 172.2cm, Lower Facial Height (LFH) > 6.62 cm and Upper Facial Height (UFH) > 6.6 cm observed to be the best parameters for identification of males of Sangli district population.

For identification of females of Sangli district population, LFH < 3.58 cm, UFH < 4.38 cm and Height < 146.87 cm found to be the best parameters.

### Discussion

The present cross sectional study was conducted to correlate the facial parameters with body height/stature of the individual of Sangli district (Maharashtra) population with Nagpur population, South Indian population, Haryanvi population, Jat population, Kattunayakan population, Gujarati population, Nepali population, Srilankan population, Nigerians population, Ijaw ethnic group, Central Serbia population.

The study was conducted after taking ethics clearance from the institute and informed written consent from the individuals. The data was collected from individuals regarding demographic profile, height and nine facial parameters.

Statistical analyses of the results were performed separately for males and females for gender variations.

### Conclusions

The values of facial parameters and stature in the present study can serve as standards for Sangli district population. They can be used as local standards for diagnostic and anthropometric evaluation in anthropology, genetics and forensic medicine.

Identification of males of Sangli district population height > 172.2cm, Lower Facial Height (LFH) > 6.62 cm and Upper Facial Height (UFH) > 6.6 cm observed to be the best parameters.

For identification of females of Sangli district population, LFH < 3.58 cm, UFH < 4.38 cm and Height < 146.87 cm found to be the best parameters.

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