ESTIMATION OF STATURE FROM CEPHALOFACTORIAL DIMENSIONS IN NORTH INDIAN POPULATION

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ABSTRACT

Background: Many forensic cases only have facial measurement it is very crucial to identified subject from facial length for this purpose morphometric data provide a special support to identification of height of a person it help many way for identification of person form database. It also help in anthropology study from where only from skeleton dimension we are able to calculating height of that subject.

Objectives: To identify the Stature from the cephalo-facial dimensions in North Indian population.

Material and Methods: A stadiometer was used to measure the stature, and the facial measurements were taken by vernier caliper, (200 males & 200 females) in the age group of 18 to 35 years.

Results: The average height of males is significantly higher than females. Mean height in males is 170.55 cm & mean height in females is 156.98 cm. The facial length is significantly more in males as compared to females. Mean facial length is 10.85 cm in males & 10.04 cm in females. The facial breadth is also more in males as compared to females. Mean facial breadth is 12.30 cm in males, whereas it is 12.04 cm in females.

Conclusion: The present study concluded that there is a statistically significant positive correlation between facial length, facial breadth and height of an individual (male & female). Height of an individual can be estimated from facial length and facial breadth in both males and females. Regression formula is derived for calculation of height of an individual from facial length and facial breadth in both males and females. Both facial length and facial breadth is more in males as compared to females.

Keywords: Facial Height, Stature, Cephalofacial dimension.

I. INTRODUCTION

Anthropometry is a study which deals with measurements and proportions of human body either living or dead, or on the skeletal remains by the most predictive method for scientific purpose.¹ Anthropometric characteristics have direct relationship with sex and form of an individual which in turn are related with internal structure and tissue components. There components are dependent on the environmental & genetic factors.² Identification of an individual is important in forensic science. In case of natural disasters like earthquake, landslides and in various accidents like aircraft crash, railway and road traffic accident, anthropometry helps in identification of the deceased person.³ It plays an important role in identification of human body parts in various crime cases & understanding of physical variations in humans.⁴,⁵
Height is represented by the length of the body, measured from the head to foot in standing position.\textsuperscript{6} Height is one of the parameter of identification which provides useful clue to the investigator, thus aiding in the process of investigation.\textsuperscript{7} The height of a person varies in different population and ethnic groups which could be due to variations in nutritional, environmental and geographical factors.\textsuperscript{8} Height increases with age of an individual from childhood to adulthood. It decreases with age because there is absence of elasticity of intervertebral substance.\textsuperscript{9}

To estimate height, anatomical & mathematical methods are used which are based on the condition and completeness of the remnants. The anatomical method is measurements of skeleton from head to toe, while the mathematical method involves calculation of living height from One or multiple bones.\textsuperscript{10}

II. MATERIAL AND METHOD

This study was conducted in the Department of Anatomy, Integral Institute of Medical Sciences & Research, Integral University Lucknow, Uttar Pradesh. The study included 400 subjects (200 males & 200 females) in the age group of 18 to 35 years. Written consent was taken from all the subjects after taking Institutional and ethical committee clearance.

Inclusion criteria:
- Healthy subject of 18 to 35 years age.
- No history of facial trauma.

Exclusion criteria:
- Subjects with spinal deformities like kyphosis, lordosis and scoliosis.
- Subjects with craniofacial deformities (Congenital or acquired).

Instruments used were:
- Stadiometer
- Digital Vernier caliper

Landmarks:

Fig.1
Zygion (Z):- The lateral most point on the zygomatic arch.[14]

Nasion (N):- It is the point where frontonasal and internasal sutures meet.[15]

Gnathion (GN):- It is lower most median point on the lower border of mandible.[14]

Vertex (V):- The highest point of the head, in the mid-sagittal plane.[14]

METHODS:
Written consent was taken from each subject. Height and facial parameters were measured with anatomical landmarks keeping the head in Frankfurt plane.

Height:
Height was measured from the vertex to the heel with the help of Stadiometer, in centimeters. (Fig-2)

Facial length:
It is the distance between nasion to gnathion measured in centimeters. The measurements were taken with the help of digital vernier caliper with the subject sitting on a chair in relaxed condition. (Fig-3)

Facial breadth:
It is the distance between the zygion of both sides of face measured in centimeters, with the help of digital vernier caliper. (Fig-4)

Fig-2 Height measurement
Statistical Analysis: Statistical analysis was performed by using computer-based software, Statistical Package for Social Science (SPSS). Mean values of parameters were compared to determine.

III. OBSERVATION AND RESULT

Our study suggested that the mean the sexual dimorphism of height with facial parameters. The average height of males is significantly higher than females. Mean height in males is 170.55 cm & mean height in females is 156.98 cm. The facial length is significantly more in males as compared to females. Mean facial length is 10.85 cm in males & 10.04 cm in females. The facial breadth is also more in males as compared to females. Mean facial breadth is 12.30 cm in males, whereas it is 12.04 cm in females. All data show in table no 1. The above result proves that there is a positive correlation between facial parameters and height of an individual.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>PARAMETERS</th>
<th>GENDER</th>
<th>NO OF SUBECTS</th>
<th>MIN –MAX (cm)</th>
<th>MEAN ±SD</th>
<th>P- VALUE</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>HEIGHT</td>
<td>MALE</td>
<td>200</td>
<td>153.1-185.2</td>
<td>170.55±6.39</td>
<td>&lt;0.0001</td>
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<tr>
<td></td>
<td></td>
<td>FEMALE</td>
<td>200</td>
<td>138-176</td>
<td>156.98±6.21</td>
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<td>2</td>
<td>FACIAL LENGTH</td>
<td>MALE</td>
<td>200</td>
<td>8.85-12.3</td>
<td>10.85±0.69</td>
<td>&lt;0.0001</td>
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<td></td>
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<td>FEMALE</td>
<td>200</td>
<td>8.025-11.92</td>
<td>10.04±0.59</td>
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<td>3</td>
<td>FACIAL BREADTH</td>
<td>MALE</td>
<td>200</td>
<td>10.125-14.275</td>
<td>12.30±0.71</td>
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<tr>
<td></td>
<td></td>
<td>FEMALE</td>
<td>200</td>
<td>9.67-14.65</td>
<td>12.04±0.64</td>
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</table>
The present study “Correlation of height with facial parameters in North Indian population” was done in IIMSR Lucknow in the age group of 18 to 35 years. Two facial parameters—facial length and facial breadth were taken and their correlation was established with height of an individual. It was found that there was a positive and statistically significant correlation between facial parameters and height of an individual.

In the present study, mean facial length in males is compared with mean facial length of Gujjars, Gujrat & Kattunayakan population. It is observed that the facial length in population of Gujjars, Gujrat & Kattunayakan had a higher value, as compared to our study but the facial length in our study showed a smaller value, when compared to the population of Mumbai, Nepalese, Haryanvi & Sangali population.

The mean facial length of females is compared with mean facial length of Gujrat & Kattunayakan population. It is observed that the facial length in female population of Gujrat & Kattunayakan had a higher value, as compared to our study; but the facial length of our study had a smaller value when compared to Mumbai, Nepalese, Haryanvi & Sangali female population.

The mean facial breadth of males in present study is compared with mean facial breadth of Mumbai & Mauritius male population. It is observed that facial breadth in the above population was higher as compared to our study, but smaller as compared to Nepalese & Sangali male population.

The mean facial breadth of females in present study is compared with mean facial breadth of Mumbai & Mauritius population. It is observed that their facial breadth was higher as compared to our study, but smaller as compared to Sangali & Nepalese female population.

Agnihotri A et al.[16] conducted a study in Mauritius population and found that there was a weak positive correlation of stature with cephalofacial dimensions. Datta et al.[14] in their study on Mumbai population, concluded that there was no significant correlation of stature with facial dimensions. Shah T et al.[3] conducted a study in Gujrat population and found that there was no significant correlation between cephalofacial dimensions and stature.
Swami et al. [2] concluded that there was a statistically significant positive correlation between stature and facial measurements. Khan K et al. [13] also found positive correlation between stature and facial height. Pokhrel C et al. [1] also concluded that there was a statistically significant positive correlation between facial parameters and stature.

Thus, it is concluded that in the present study there is a statistically significant positive correlation between facial length, facial breadth and height of an individual.

<table>
<thead>
<tr>
<th>S. NO</th>
<th>AUTHORS</th>
<th>POPULATION</th>
<th>HEIGHT (cm)</th>
<th>FACIAL LENGTH (cm)</th>
<th>FACIAL BREADTH (cm)</th>
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<tr>
<td></td>
<td></td>
<td></td>
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<td>FEMALE</td>
<td>MALE</td>
</tr>
<tr>
<td>3</td>
<td>Shah T et al.2015[3]</td>
<td>Gujarati</td>
<td>164.3</td>
<td>150.56</td>
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<td>4</td>
<td>Jaiswal A et al.2016[17]</td>
<td>Kattunayakan</td>
<td>165.66</td>
<td>151.04</td>
<td>5.72</td>
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<td>7</td>
<td>Swami et al.2015[2]</td>
<td>Haryanvi</td>
<td>168.71</td>
<td>155.18</td>
<td>11.07</td>
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<tr>
<td>9</td>
<td>Mane et al.2018[12]</td>
<td>Sangali</td>
<td>166.80</td>
<td>152.91</td>
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<td>North India</td>
<td>170.55</td>
<td>156.98</td>
<td>10.85</td>
</tr>
</tbody>
</table>

V. CONCLUSION

The present study concluded that there is a statistically significant positive correlation between facial length, facial breadth and height of an individual (male & female). Height of an individual can be estimated from facial length and facial breadth in both males and females. Regression formula is derived for calculation of height of an individual from facial length and facial breadth in both males and females. Both facial length and facial breadth is more in males as compared to females.

REFERENCE


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