

Estimation of Stature from Maxillo-Facial Measurements among Brahmins of Himachal Pradesh

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Abstract

An attempt has been made in the present study to reconstruct stature using maxillofacial measurements among male and female Brahmins of Himachal Pradesh. Sample size comprises of 164 Brahmins (93 males and 71 females) who were measured for Facial Height (FH) and Nasal Height (NH) besides Stature (S) following the standard measurement techniques. All the subjects ranged in age from 18 to 40 years. Result of the present study highlight that the stature could be reconstructed with relatively greater reliability using FH among Brahmin males and females. The results further reveal that males exhibit greater correlation with stature than the females while the error of estimate is lower among females as compared to the males. It may be mentioned here that both these maxillofacial dimensions could be used for reconstructing stature under the circumstances when only cranium is recovered from the scene of crime.

Introduction

Identification of skeletal remains recovered from crime scenes requires apposite examination in order to fix the distinctiveness of the deceased.

According to forensic experts the dead persons and human skeletal remains contain a wealth of information. But the postmortem injuries and corrosion of the body may alter the general appearance and also the significant features of deceased to such an extent that the visual identification even by close relations may not be possible. According to Mant (1984) the

problem of identification may be grouped in to following categories:

- Recently dead persons,
- Decomposed and mutilated bodies,
- Skeletal remains, and
- Fragmentary remains.

Identification in case of recently dead bodies can be performed by examining bodily features and fingerprints, but in case of decomposed and mutilated bodies one may require a vigilant examination as the morphological features are smashed. In such situations blood and tissue culture examinations may facilitate in recognition. The analysis of skeletal and fragmentary remains is an imperative aspect and the expert is required to have sufficient comprehension of human and comparative anatomy to answer the following key question that may arise during the examination:

Whether the bones are of human or of non human?

Whether they belong to one or more individual?

What would be the sex?

What is the age?

What is the ethnic group of the individual?

How tall the person would be?

What are the other distinguishing characteristics in the skeletal remains that may lead to Personal identification?

In the beginning of the past century the researchers around the globe used long bone lengths for reconstruction of stature by constructing regression formulae as they had access to the documented skeletons of known origin and ancestry (Stevenson, 1928; Telkka, 1950; Trotter and Gleser 1958; Allbrook, 1961) But due to genetic diversity these formulae were

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population specific as well as exhibited sex differences.

However in a country like India the researchers initially used the formulae constructed by the western scholars but soon they realized the error and started working on the Indian skeletal material. There was a serious problem in locating documented skeletons and thus an attempt was made to use the dissecting room population. The length of the deceased and the long bones were measured and the data were subjected to the formulation of M.Fs (Pan, 1924; Nat, 1931). Subsequently other researchers involved themselves in formulating the regression formulae by measuring percutaneous length of the long bones as per the method suggested by Allbrook (1961)

Most of the studies pertaining to this aspect have used conventional measurements of the long limb bones to formulate prediction equations or Multiplication factors (MF) on different Indian living populations (Nath and Chandra, 1986; Nath et al, .1990; Nath, 1997, 2005; Bhavna and Nath, 2007). Toward the close of the last century researchers diverted from the use of conventional measurements and took other body measurements like hand length, foot length, mid-finger length. They observed these measurements to be quite reliable for prediction of stature. This was followed by yet another phase where researchers used cranio-facial measurements for this purpose and revealed that there exists a significant correlation between these measurements and stature

In the present study an attempt has been made to reconstruct stature among Brahmins of Himachal Pradesh using two maxillo-facial measurements.

Material and Methods

The present study was conducted on male and female Brahmins of Tehsil Kasauli, district Solan, Himachal Pradesh. The area was predominantly

inhabited by Rajputs and Brahmins besides certain other backward castes.

With a view to accomplish the objectives of the present study a total of 164 unrelated Brahmins (93 males and 71 females) in the age range of 18 to 40 years were measured for Facial height (FH) and Nasal Height (NH) besides Stature (S) using standard measurement techniques Martin and Saller(1959).

Stature (S):

It is obtained as a projective distance from the standing surface to the highest point on the head (Vertex) when the subject is standing in standard arm hanging position, using anthropometer rod.

Facial Height (FH):

It is obtained as a direct distance between Nasion and Gnathion, using sliding caliper.

Nasal Height (NH):

It is obtained as a direct distance between Nasion and Sub-nasion, using sliding caliper.

Data were subjected to statistical analysis using standard SPSS program to obtain mean, standard error of mean, test of significance, calculation of M.Fs besides correlation and regression analysis to formulate prediction equations for estimation of stature.

Results and Discussion

Table-1 presents basic statistical constants of all the three measurements among male and female Brahmins along with the value of test of significance. It is evident from the table that the male Brahmins are not only taller than the female ones but also possess longer face and nose. These apparent differences, when subjected to t-test, reveal highly significant sex differences in all the three body dimensions among Brahmins.

Owing to the highly significant sex differences the data were treated separately for computation of multiplication factors and correlation regression analysis.

TABLE 1; SEX DIFFERENCES IN MAXILLO-FACIAL MEASUREMENTS AND STATURE AMONG BRAHMINS OF HIMACHAL PRADESH.

| S.No | Measurement | Males N=93 | | Females N=71 | | Value of t- test |
|------|-------------|------------|-------|--------------|-------|------------------|
| | | Mean | error | Mean | error | |
| 1 | Stature | 166.86 | 0.75 | 155.24 | 0.62 | 11.72* |
| 2 | FH | 17.97 | 0.48 | 16.79 | 0.09 | 8.70* |
| 3 | NH | 5.01 | 0.04 | 4.68 | 0.04 | 5.66* |

· Significant at 1 percent level of significance.

Tanle-2 lists the value of Multiplication factors formulated for male and female Brahmins of Himachal Pradesh. It is apparent that the value of MF is greater for males than that of the one observed for females for both the measurements.

TABLE 2: MULTIPLICATION FACTORS FOR ESTIMATION OF STATURE FROM MAXILLO-FACIAL MEASUREMENTS AMONG BRAHMINS OF HIMACHAL PRADESH

| S.No | Measurement | Males | females |
|------|-------------|-------|---------|
| 1 | FH | 9.29 | 9.26 |
| 2 | NH | 33.44 | 33.35 |

Table -3 lists the regression equations formulated for prediction of stature using Facial Height and Nasal Height for male and female Brahmins along with their respective values of Standard Error of Estimate (SEE) and correlation(r). It is evident from the table that the value of correlation is greater for FH than NH for either sex .The overall highest correlation is observed between FH and Stature for Male Brahmins

indicating that it could provide a better estimate of stature in comparison to NH .The nasal height exhibits a sufficiently greater value of r for males suggesting that it would provide a better estimate for males in comparison to females. However the error of estimate is lower for both the measurements among females on comparison that the one observed for males.

TABLE 3: REGRESSION EQUATIONS FOR ESTIMATION OF STATURE FROM MAXILLO- FACIAL MEASUREMENTS AMONG BRAHMINS OF HIMACHAL PRADESH

| S.No | Regression Equations | SEE | 'r' |
|----------------|----------------------|-------|------|
| MALES | | | |
| 1 | S=100.44+8.99(FH) | ±6.65 | .395 |
| 2 | S=137.29+1.76(NH) | ±6.83 | .336 |
| FEMALES | | | |
| 3 | S=118.30+0.707(FH) | ±4.96 | .351 |
| 4 | S=139.97+1.72(NH) | ±5.16 | .222 |

To conclude it may be suggested that both facial height and nasal height could be used for having an estimate of stature using regression equations or M.Fs, under the circumstances when only a skull is recovered from the crime scene and one could take both these measurements after ascertaining the sex of the skull.

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