Estimation of Stature from Nasal Dimensions

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Abstract

The objective of this study was to estimate stature from nasal measurements in South Indian population. The study was done using standard measuring apparatus measuring tape and vernier calipers including both males and females.

Regression formula and correlation was derived between nasal dimensions and stature. In this study, regression formula is derived with three variables generalized for both males and females, S= 118.005+6.804NL+4.003NW+0.254NH $\Box$ 9.70100. Linear Regression equation for males and females have been derived separately with each of the nasal parameters. In conclusion nasal measurements can be an effective tool in estimating stature.

Keywords: *Stature estimation, nasal height, nasal length, nasal width.*

Introduction

Estimation of stature is a vital tool in forensic examination especially in unknown, highly decomposed, fragmentary and mutilated human remains. Identification of human skeleton remains is an important aspect of forensic examination. Stature is one of the reliable parameters in medico-legal examination. The human body dimensions are affected by geographical, racial, gender, and age factors. Physical measurements can be worked out and used in differentiation of racial phenotypes[1]. Stature reconstruction is important as it provides aforensic anthropological estimate of the height of a person in the living state; playing a vital role in the identification of individuals[2].Stature is the height of the person in erect posture and this can determine the physical identity of a person. It happens many a times when highly decomposed or mutilated bodies or sometimes only facial remains of skull are brought

for medico-legal examination stature examination is important including age, sex and race[3]. There is a definite biological relationship of stature with the all body parts[4]. Many studies have been conducted on the estimation of stature from various body parts like hands, trunk, intact vertebral column, upper and lower limbs, individual long and short bones, foot and footprints[5]. Usually, long bones measurements are used to estimate stature[6]. This forensic assessment of stature helps identify individuals. Thereby helping medico-legal and forensic investigations.

Materials and Method

It is a cross sectional study consisting of South Indian population. Subjects irrespective of sex, with age of 18 years, those who have given their consent were included in this study and those who have not given consent, those below 18 years of age were excluded from this study. Source of data is predominantly from the residents of Chennai. They are measured for stature using stadiometer/measuring tape (Person should stand erect with head in the Frankfurt plane. Heels are together, with weight distributed equally on both feet; Shoulders and the upper extremities are kept relaxed), and for nasal dimensions (using Vernier calipers): nasal height– distance between the nasion of the nose posteriorly and the subnasale, below the nasal septum; nasal width–

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distance between the external surface of one ala to the other at right angle to the other at right angle to the nasal height; nasal length – distance from the nasion to the pronasale (tip of the nose).All the dimensions are recorded to the nearest centimeter using standardized measuring equipment and sliding calipers. Since stature is variable among population, age and sex, regression formula have been derived for the population. The data will be tabulated, analyzed and subjected to statistical calculation using SPSS software. It is then used to derive a relation between nasal dimensions and height.

Implications: The expected results from this study is knowledge of relation between stature and nasal dimensions and its importance in medico-legal and forensic examinations.

Result

Estimation of stature using nasal measurements:

Table No: 1

Parameter	Male	Female
Total Number	34	41
Mean of Stature	171.05	154.64
S.D of Stature	7.56	4.89
Mean of Nasal Length	4.34	4.23
S.D of Nasal Length	0.40	0.30
Mean of Nasal Width	3.47	3.34
S.D of Nasal Width	0.51	0.47
Mean of Nasal Height	5.44	5.29
S.D of Nasal Height	0.41	0.51

Table No: 2: Correlation of stature with nasal dimensions

	Correlation
Nasal Length	0.351
Nasal Width	0.335
Nasal Height	0.271

	Male	Female
Nasal Length	0.474	0.225
Nasal Width	0.404	0.356
Nasal Height	0.390	0.121

Table No: 3

Linear Regression equation for Male
Regression equation$\pm$SEE
S= 132.071+8.983NL$\pm$6.762
S=150.157+6.020NW$\pm$7.026
S=131.486+7.273NH$\pm$7.074
Linear Regression equation for Female
Regression equation$\pm$SEE
S= 139.184+3.655NL$\pm$4.822
S=142.356+3.684NW$\pm$4.624
S=148.544+1.153NH$\pm$4.912

Correlations				
	Stature	**NL**	**NW**	**NH**
Stature	1	.351[**]	.335[**]	.271[*]
NL		1	.592[**]	.584[**]
NW			1	.652[**]
NH				1

*Correlation is significant at the 0.05 level (2-tailed).,
**Correlation is significant at the 0.01 level (2-tailed).

Regression equation

Regression equation$\pm$SEE

S = 118.005+6.804NL+4.003NW+0.254 NH$\pm$9.70100

Discussion

Estimation of stature is important in forensic examination especially in unknown, highly decomposed, fragmentary and mutilated human remains. The commonly used parameters are hands, trunk, limbs, bones, footprints and intact vertebral column. Since all these parts of the body and bones are not always available for forensic examination, it becomes necessary to make use of other parts of the body like face and head region. Other parameters for stature estimation are cephalo-facial region, foot measurements, hand measurements, etc. For investigation and identification of an individual, age, sex, stature, etc., are estimated from the other reliable parameters. In identification of human remains, forensic anthropologists help to interpret evidence pertaining to manner or cause of death. Stature estimation can be possible with the help of these parameters when only the skull or remains of the skull are available for medico-legal examination.

Objective of this study is to estimate the stature of an individual with the help of nasal measurements-nasal height, nasal breadth and nasal length. Study design is cross sectional. It is done among the adults in South Indian population, with informed consent given. Inclusion criteria is the adult population with consent given. Exclusion criteria includes population under the age of 18years and those who have not given consent.

The study was conducted among 75 adults, out of which 34 were males (45.33%) and 41 were females (54.67%). Stature and nasal measurements were taken using standard measuring tape and vernier calipers respectively. Tabulated values are the mean and standard deviation values of nasal height, nasal length and nasal width derived from the entire sample space and also according to the sex distribution. Correlation and regression formula have been derived from the collected data which helps us to estimate stature from the nasal dimensions.

Stature can be estimated either by multiplying the parameter with the derived multiplication factor or can be measured by employing regression equation. The regression analysis is considered to be the best for stature estimation. In this study, regression formula is derived with three variables generalized for both males and females, S= 118.005+6.804NL+4.003NW+0.254NH □ 9.70100. Linear Regression equation for males and females have been derived separately with each of the nasal parameters.

In this study only nasal dimensions are used as a parameter to estimate stature. Most of the researchers (Lukpata PU, Agnihotri AK, Wankhede KP, Patil KR, Kharyal A, etc) have used nasal height in conjunction with other cephalo facial parameters and it gives a positive correlation; the values being higher in males as compared to females.

Conclusion

Evidence from the present study appears to support the fact that nasal measurements can be effective tool in assessing forensic stature of subjects for any purpose. The correlation of the parameters with the stature will vary according to the geographical areas. It can be concluded that the calculation regression formula shows good reliability and applicability of estimation of stature.

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