



Estimation of Stature from Nasal Length

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ABSTRACT

Introduction: Estimation of stature for the purpose of identification has a significant forensic importance. This technique is based on a principle that bones or human body parts correlate positively with the stature. Stature can be estimated from measurements of various body parts such as arm, leg, feet, finger, facial height, nasal height etc. The aim of study was to correlate Stature of Nepalese with Nasal height and estimate Stature from Nasal height.

Methods: A cross-sectional study of 214 healthy adults comprising 110 males and 104 females in the age group of 25 to 35 years were carried out. Study was carried out in central Nepal where people from various parts of Nepal are migrated. Total body height and Nasal height were recorded with stadiometer and sliding caliper respectively.

Results: The mean of total body height in the male and female was 160.4 (± 6.80) cm and 151.8 (± 4.88) cm respectively. The mean of nasal height in the male and female was 4.6 (± 0.31) cm and 4.3 (± 0.29) cm respectively. This study observed that in both male and female nasal height had positive partial correlation with stature; $r = 0.18$ for male and 0.19 for female. Stature in nepali population could be calculated as: $\text{Stature} = 148.22 + 3.02 \times \text{nasal height}$ in male where as $\text{Stature} = 133.01 + 3.12 \times \text{nasal height}$ in female.

Conclusions: Both Nepali male and female nasal height had positive partial correlation with stature; $r = 0.18$ for male and 0.19 for female. Stature in Nepali population could be calculated as: $\text{Stature} = 148.22 + 3.02 \times \text{nasal height}$ in male where as $\text{Stature} = 133.01 + 3.12 \times \text{nasal height}$ in female.

Keywords: estimation; stature; nasal height.

INTRODUCTION

There is a correlation of height of person with his body parts such as upper and lower limbs or its parts, head, trunk and vertebral column.¹⁻⁴ Many studies have been carried out for estimation of stature from measurements of various body parts such as arm, leg, feet, finger, etc.⁵⁻⁷ and few studies have been done for stature estimation from face alone.⁸⁻¹² It is an well established fact that each race requires its own research finding for stature estimation because of ethnic, dietary and

climatic variations. Hence results of studies done in one population cannot be applied to other populations.¹² Therefore there is a need for research study in this region. Considering this fact, the present study was undertaken to estimate stature from nasal height.

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The study findings will be useful for forensic expert. It might be a case that highly decomposed or mutilated bodies with fragmentary remains of face are presented for medico-legal examination and under such circumstances identification is difficult. Using present research finding forensic expert can estimate body height of deceased from nasal height and establish the identity of the deceased. The aim of study was to correlate Stature of Nepalese with Nasal height and estimate Stature from Nasal height.

METHODS

This was a cross-sectional study carried out in central Nepal where people from various parts of Nepal are migrated. Simple random sampling method was adopted in the study. A total of 214 healthy adults comprising 110 males and 104 females in the age group of 25 to 35 years were studied. Subjects with any obvious congenital or acquired deformity of spine extremity or head were excluded from the study. Measurements were recorded to the nearest millimeter without ruling out soft tissue thickness. The following parameters were recorded:

Total body height (Stature): The stature was measured in standing position to the vertex in Frankfurt plane by using stadiometer anthropometric rod.

Nasal height (NH): The straight distance between the Nasion and the Naso-spinale (at lowest point of columella) was measured. It was measured by using sliding caliper. Naso-spinale is the point at which a line drawn between the lower margins of the right and left nasal apertures intersects the mid-sagittal plane

To eliminate inter observer bias all the measurements were taken by one author. The measurements were taken three times and their average value was taken as a final measurement. The data were entered into Microsoft excel and statistical analysis was done

using SPSS version 16. Statistical tools like regression analysis and correlation coefficient were used for statistical analysis.

RESULTS

The study consists of 214 healthy subjects consisting of 110 males and 104 females in the age of 25-35 years. The mean age of subjects was 30.5 years. In the study, the mean of total body height in the male and female was $160.4(\pm 6.80)$ cm and $151.8 (\pm 4.88)$ cm respectively. The results showed that there was significant difference in total body height between male and female ($p < 0.05$).

The mean of nasal height in the male and female was $4.6(\pm 0.31)$ cm and $4.3 (\pm 0.29)$ cm respectively. The results showed that there was significant difference in nasal height between male and female ($p < 0.05$).

Table 1. Comparison of Mean \pm standard deviation of Total body height and Nasal height in centimeter between male and female.

Parameters	Male (n = 110)	Female (n = 104)	P value
Total body height	160.4 \pm 6.82	151.8 \pm 4.88	0.03
Nasal height	4.6 \pm 0.31	4.3 \pm 0.29	0.04

The regression equations were derived and are shown in table 2. The regression equation had been calculated by regression analysis of the data and the values of constants 'a' and 'b' are calculated; where 'a' is the regression coefficient of the stature and 'b' is the regression coefficient of nasal height. Therefore stature = a + bx, where x is nasal height parameter. It was observed that in both male and female nasal height had positive partial correlation with stature; $r = 0.18$ for male and 0.19 for female.

Table 2. Statistical analysis with regression coefficient for stature(a), regression coefficient for nasal height(b), correlation coefficient(r) and regression equation.

Sex	Variable	b	r	P value of r	a	Regression equation
Male	Nasal height	3.02	0.18	0.01	148.22	Stature = 148.22 + 3.02x nasal height
Female	Nasal height	3.12	0.19	0.03	133.01	Stature = 133.01 + 3.12x nasal height

DISCUSSION

Many studies had been conducted in past to establish correlation of stature with other body parts such as upper and lower limbs, head, trunk and vertebral column. Many studies had been conducted for estimation of stature from measurements of various body parts such

as arm, leg, feet, finger, etc. However, few studies are conducted for stature estimation from facial region.

Jiobonkumar et al had studied 199 male Kabui people of Imphal valley, and they noted that total facial height was a better parameter to estimate stature.⁸ Similar

findings were noted by Krishnan.⁹

Kharyal et al. in 2008 did a study on Brahmins of Himanchal Pradesh and calculated estimation of stature from maxilla-facial height parameters and observed that stature had partial positive correlation with total facial height ($r=0.39$ in male and 0.35 in female) and with nasal height ($r=0.36$ in male and 0.22 in female).¹⁰

Likewise Agnihotri et al, had done a research study on Indo-Mauritian population in 2011 and estimated stature from cephalo-facial dimensions and found that stature had partial positive correlation with total facial height ($r=0.32$ in male and 0.16 in female) and with nasal height ($r=0.19$ in male and 0.15 in female).¹¹

In the present study it had been noted that in both male and female nasal height had positive partial correlation with stature; $r = 0.18$ for male and 0.19 for female.

Kanchankumar P Wankhede et.al had carried out a study of estimation of stature from maxillo-facial anthropometry in a central Indian population and it was observed that in males the total facial height had greater correlation with stature ($r=0.19$) and in females, nasal height had greater correlation with stature ($r=0.19$). Overall their study result was that stature had partial positive correlation with total facial height ($r=0.19$ in male and 0.14 in female) and with nasal height ($r=0.18$

in male and 0.19 in female).¹²

Stature can be estimated, either by multiplying the parameter with the derived multiplication factor or can be measured by employing regression equation. Now most of the researchers considered that regression analysis is the best for stature estimation.⁹⁻¹¹

The method of using total facial height and nasal height has several advantages as the method is easy, the anatomical landmarks are standard, well-defined and easy to locate and required least instrumentation. The disadvantage is that the parameters may have insignificant correlation in comparison with bare bone measurements since the study was conducted with intact soft tissues covering the face. However, such a study assumes significance when the body is mutilated into multiple parts or only isolated facial structure is presented for forensic examination.¹²

CONCLUSIONS

This study observed that in both male and female nasal height had positive partial correlation with stature; $r = 0.18$ for male and 0.19 for female. Stature in Nepali population could be calculated as: Stature = $148.22 + 3.02 \times$ nasal height in male where as Stature = $133.01 + 3.12 \times$ nasal height in female.

Conflict of Interest: None.

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