

Original Research Paper

Correlation of Upper Facial and Lower Facial Height in Garhwali Population of Uttarakhand

¹P Hatwal, ²DK Atal, ³S Das

Abstract

Craniofacial anthropometry, as an important part of anthropology, is used to determine the morphological characteristics of head and face. It is particularly important in planning and evaluation for facial reconstructive surgeries. Facial measurements depend on various factors, such as gender, race and ethnicity, climate, socio-economic, nutritional and genetic. The study group included 100 males and 100 females, between 18-45 years belonging to the Garhwal region of Uttarakhand. Subjects with craniofacial diseases and abnormalities, growth related disorders and history of facial trauma / reconstruction surgery were excluded from the study group. The bisexual variation of upper and lower face height was observed. The mean values of Upper, Lower and Total facial heights were greater in males. However, from statistical analysis it was also observed that the coefficient of determination was low (0.04). So, further study in relation with other racial groups and with increased number of subjects is suggested.

Key Words: Upper Facial Height, Lower Facial Height, Garhwali, Anthropometry, Identification

Introduction:

Anthropometry has been utilized for Forensic purposes especially in the identification of individuals. Facial anthropometric features are used for facial reconstruction, especially in cases where DNA cannot be obtained. In facial reconstruction various parameters are used to develop an image to compare with the life size photograph. Very few studies have been conducted to determine various parameters for facial reconstruction.

Baral et al conducted an anthropometric study of facial height on 857 subjects in the Sunsari district of Nepal. [2] They reported statistically significant differences of upper and lower facial height proportions among the different racial groups. They also concluded that the facial height proportion between male and female were insignificant. [2] No such study has been done in this region. The present study aims to examine the differences in facial height proportions i.e. Upper facial and Lower facial heights in Garhwali population of Uttarakhand and to determine whether there is any significant ratio in male and female.

Corresponding Author:

²Assistant Professor, Dept. of Forensic Medicine, HIMS, SRH University, Jolly Grant, Dehradun, Uttarakhand-248140

Email: drdevinderatal_fmt@rediffmail.com

¹MBBS Student

³Prof & HOD

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Materials and Methods:

The study was conducted as a part of a Short Term Research Project at the Himalayan Institute of Medical Sciences. The study group was comprised of 200 subjects (100 male and 100 female), aged between 18 to 45 years, and belonging to the Garhwal region of Uttarakhand.

The study was done over a period of 3 months. Children below 18 years and adults above 45 years, cranio-facial diseases and abnormalities, growth related disorders and history of facial trauma / reconstruction surgery were excluded from the study.

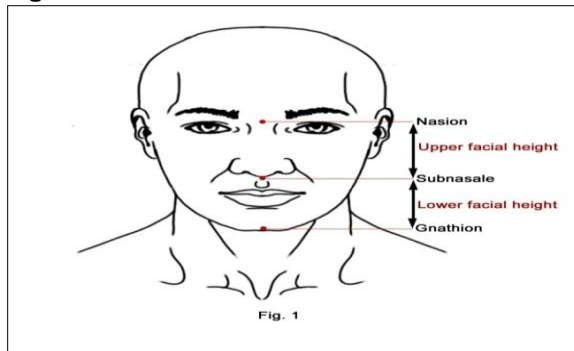
Prior clearance was obtained from the Institutional Ethics Committee. The subjects were examined after taking informed consent.

The anterior aspect of face, from above downwards, consists of frontal region, cheek and lower jaw with some important surface landmarks including glabella, nasion, zygoma, subnasale, Gnathion, etc. as described below.

- **Glabella:** It is a small horizontal ridge, is present between the superciliary arches. [3]
- **Nasion:** Below the glabella the nasal bones meet the frontal bone in a small depression at the root of nose [3] or the point on the root of nose where the mid-sagittal plane cuts the naso-frontal suture. [2]
- **Subnasale:** The point at which the nasal septum merges with the upper cutaneous lip in the mid-sagittal plane. [2]
- **Gnathion:** The lowest point on the lower border of the mandible in the mid-sagittal plane. [2]

- **Upper facial height (UFH)** = Distance between nasion and subnasale. [2]
- **Lower facial height (LFH)** = Distance between subnasale and Gnathion. [2]

Fig. 1:



The upper and lower facial heights were measured in all the subjects and the data was used to determine the range, the mean and standard deviation. The data was statistically analysed to determine any significant correlation between upper and lower facial heights.

The 'p' value was calculated to study sexual dimorphism in upper facial and lower facial heights. The 'p' value of <0.04 was considered statistically significant.

Observations and Results:

In this study the bisexual variation of upper and lower face heights was observed. The mean values of Upper, Lower and Total facial heights were greater in males.

The maximum values for Upper, Lower and Total facial Heights in males were greater in comparison to female. (Table 1 & 2)

It is also evident from this study that the relationship between upper and lower face height is significant. (Table 1 & 2) However, from statistical analysis it is also observed that the coefficient of determination is low (0.04).

Discussion:

Baral et al and Hussain A Obaidi studies showed that there is no significant difference in facial height proportions between males and females in different population group ($p > 0.05$). [2, 4] However, Omotoso et al observed 'sexual dimorphism' in all the dimensions of face and nose, the males having higher mean values than the females. The result also showed that in all the studied dimensions there is increase in mean values from lower to higher age groups. [5] Jeremic et al observed that males have significantly higher values of morphological facial height, facial breadth and total facial index compared to the tested females ($p < 0.001$). [1]

The current study is in agreement with Omotoso et al and confirmed the bisexual

variation of upper and lower face height. The mean values of Upper, Lower and Total facial height were greater in males.

In addition, the minimum and maximum values for Upper, Lower and Total facial Heights in males were greater in comparison to females. Baral et al found statistically significant differences of the UFH and LFH proportions among the different racial groups. [2]

Hussain A Obaidi also observed that there was certain variation in facial height among dentoskeletal groups. [4] Folaranmi et al had conducted a study to measure anterior facial height of school children in Nigeria. Total 100 subjects (60 females and 40 males); aged 12-15 yrs were radio-graphed.

They observed that the proportion of Anterior Lower Facial Height (ALFH) to anterior Total Facial Height (ATFH) is 56%. [6] The current study is limited to Garhwali population, however, relationship between upper and lower face height is significant. Moreover, from statistical analysis it is also observed that the coefficient of determination is low (0.04).

Hence, further study in relation with other racial groups and with increased number of subjects is suggested.

Conclusions:

The bisexual variation of upper and lower face height was observed. The relationship between upper and lower face height is also significant but from statistical analysis the coefficient of determination is low.

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Table 1: Mean and Range of Upper Facial Height and Lower Facial Height in Males

	UFH (mm)	LFH (mm)	TFH (mm)
Mean	48.051	57.344	105.395
Range	40.12 - 56.42	45.22 - 70.12	92.34 - 118.54

Table 2: Mean and Range of Upper Facial Height and Lower Facial Height in Females

	UFH (mm)	LFH (mm)	TFH (mm)
Mean	45.864	54.8	100.664
Range	37.22 - 54.12	43.42 - 65.22	88.34 - 113.74