Bangladesh Journal of Anatomy July 2013, Vol. 11, No. 2 pp. 50-53

Original Articles

Photographic Estimation of Facial Height and Nasal Length of Bangladeshi Women

Nazma Farhat[1], Humaira Naushaba[2], Rita Rani Saha[3], M Tanveer Hossain Parash[4], Jubaida Gulshan Ara[5], Mallika Karmakar[1]

Abstract

Context: *Estimation of facial height and nasal length from digital photography is important to evaluate and planning surgical treatment of facial trauma, facial defect and post traumatic deformity. So facial height and nasal length values are of great use in plastic surgery and reconstructive surgery. These values are also important for identification of a person in forensic anthropology and archeology. The reliability of estimation of facial height from nasal length by using multiplication factor is high. The values of facial height and nasal length vary among populations.*

Materials and Method: *This is a cross sectional, analytical type of study conducted in the Department of Anatomy, Sir Salimullah Medical College, Dhaka from January 2010 to June 2011. One hundred (100) Bangladeshi 25 to 45 years old women were selected for the study. Fourth class female employees of Sir Salimullah Medical College and Mitford Hospital and part time housemaids of Mitford area were selected by purposive sampling as study subjects.*

Results: *The values of facial height and nasal length were 17.949 ± 1.3111cm and 5.179 ± 0.5349cm respectively. Multiplication factor for measuring facial height from nasal length was 3.49 ± 0.2864 (Mean ± SD). No significant difference was found between the measured and estimated facial height from nasal length.*

Conclusion: *The anthropometric base line data of different facial dimensions might help the surgeons in diagnosing and treating reconstructive cases.*

Key words: *Facial height, nasal length, multiplication factor, digital photography.*

Introduction

Face is one of the most attractive parts of the body. It shows differences among races and genders. The concept of harmony, equality and proportion of the face is studied by different methods. Anthropometric studies in different populations have stated the proportional correlations in face[1].

The face provides our identity as individuals. Identification of facial feature plays an important role in many facial image applications like human computer interaction, video surveillance, face detection, face recognition, facial expression classification, face modeling and face animation[2].

Face anthropometry is the science of measuring sizes and proportions of human faces. Face anthropometric studies provide a quantitative description of craniofacial complex and are used in categorizing normal and abnormal faces[3].

The craniofacial normative values are helpful to head and maxillofacial surgeons in the treatment of reconstructive and plastic surgery. For treating congenital or post traumatic facial disfigurements, surgeons require access to craniofacial data based on accurate anthropometric measurements. Normative data of facial measurements are indispensable for precise determination of the degree of deviations from the normal. So the

1. Assistant Professor, Department of Anatomy, Shaheed Monsur Ali Medical College, Dhaka
2. Professor and Head, Department of Anatomy, Sir Salimullah Medical College, Dhaka
3. Proferssor (c.c.), Department of Anatomy, Shaheed Monsur Ali Medical College, Dhaka
4. Associate Professor (c.c.) Department of Anatomy, Ad-din Medical College, Dhaka
5. Assistant Professor, Department of Anatomy, Sir Salimullah Medical College, Dhaka

Correspondence: Dr. Nazma Farhat

knowledge of the anthropometric and cephalometric measurements is essential before planning treatment[4].

Jasuja and Singh noted that facial anthropometric measurements are important in finding out a person in any accidental cases like road traffic accident, burn, natural disaster, plane crash etc. Forensic anthropologists frequently work in combination with forensic pathologists, odontologists and homicide investigators to identify a decedent, discover evidence of foul play[5,6].

Materials

The study was a cross sectional, analytical type of study which was carried out from January 2010 to June 2011 in the Anatomy Department of Sir Salimullah Medical College, Dhaka. One hundred (100) Bangladeshi female were selected. Age of the subjects ranged from 25 to 45 years.Fourth class female employee of Sir Salimullah Medical College and Mitford Hospital and part time housemaids of Hospital area were selected by purposive sampling.

Methods

Operational definations:

The vertical distance from 'trichion'(the midpoint of the hairline) to 'gnathion'(the lowest point on the lower border of chin in the midline) of the face is considered as facial height (Fig.-1a). It is the physiological facial height. Nasal length (Fig.-1b) is considered as vertical distance from 'nasion' (intersection of the frontal and two nasal bones) to 'subnasale'(it is the point that lies in the middle on the lower border of the nose)[7].

The photograph was taken after the subject was seated comfortably on a chair looking straight to the camera which was fixed on its stand at the same level of the subject's head having a distance of 120 centimeter, both eyes opened and mouth closed with a fixed focus, zoom and illumination. Facial height and nasal length of the subjects were measured by digitizing points at trichion, gnathion, nasion, subnasale and then vertical lines were drawn on the above mentioned points and photographic measurements were recorded by using the computer program Adobe Illustrator Version-10. The measured photographic values were multiplied by the corresponding conversion factor to estimate the actual value.

Calculation of conversion factor(CF)[3]

The conversion factor is a ratio, calculated by dividing a physically measured value of a variable, with a photographically measured value of the same variable of each subject to convert photographically measured values to actual measurements.

To calculate the conversion factor of a particular photograph, the physically measured facial height of each subject was divided with the photographically measured facial height of that subject. Then facial height and nasal length of the subject measured from the photograph were multiplied by the conversion factor to know the actual measurement. By this way the photograph was measured.

Formula for calculating Conversion factor

$$CF = \frac{\text{Facial height measured by physical method}}{\text{Facial height measured by photographic method}}$$

Calculation of multiplication factor[3]:

Multiplication factor is the ratio between two measurements which is used to estimate value of one variable from another.

Formula for calculating multiplication factor

$$MF = \frac{\text{Facial height}}{\text{Nasal length}}$$

Ethical Clearence:

The study was approved by the Ethical Review Committee of Sir Salimullah Medical College, Dhaka.

Results

Table I shows the mean (± SD) of facial height and nasal length of the subjects. The purpose of

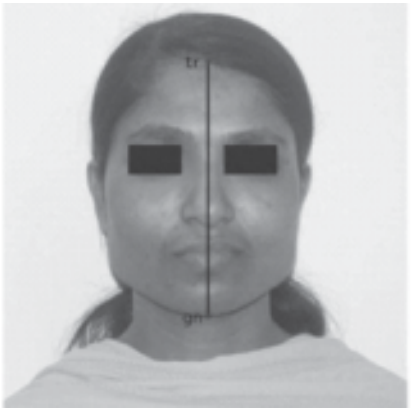

Fig.-1 a: *Photographic measurement of the facial height from trichion to gnathion (tr-gn). (tr indicate trichion, gn indicate gnathiom)*

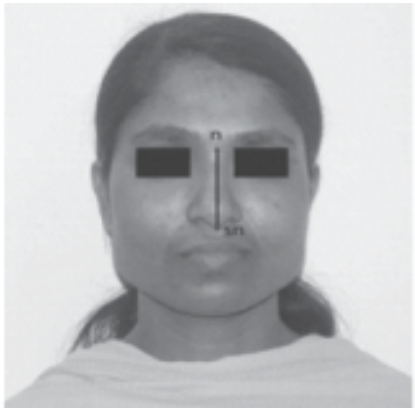

Fig.-1 b: *Photographic measurement of the nasal length (n-sn). (n indicate nasion, sn indicate subnasale)*

calculating multiplication factor was to estimate facial height from nasal length. The results indicate the effectiveness of the corresponding multiplication factors when facial height was measured from nasal length. Significant positive correlation was found between facial height and nasal length (Fig.-2).

Table-I

Facial height, nasal length, multiplication factor and comparison between measured and estimated facial height.

Variables	Mean ± SD (cm)	Multiplication factor for estimating facial height from nasal length Mean ± SD (cm)	Estimated facial height from nasal length Mean ± SD (cm)	Significance of difference (p value) between measured and estimated facial height
Facial height	17.949 ± 1.3111	3.49 ± 0.2864	18.089±1.8804	p=0.276 (NS)
Nasal length	5.179± 0.5349			

n: 100 subjects, NS= Non-significant at 5% level of significance on two-sample Z test, S: Significant at 5% level of confidence in regression analysis, , SD: Standard deviation.

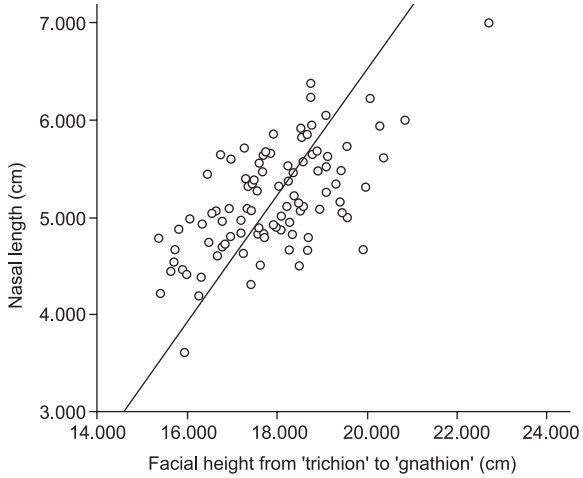

Fig.-2:*Scatter diagram with regression analysis showing significant positive correlation between the facial height and nasal length (r=0.628 and p= 0.000).*

Discussion

The findings of the present study were compared with the findings of the studies carried out by other researchers where women of Greece, Czechoslovakia, Italy, Iran, India (Andaman) and Garo Bangladeshi were included.

The Greek, Czech, Italian are Caucasoids, the Iranian are Aryans, the Andaman are Negroids, the Garo Bangladeshi are Mongoloids by race[8]. However, the subjects of this study are Bangladeshi women who belong to mixture of Austric, Indo-Aryan, Mongolian and Dravidian groups[9].

The mean values of facial height of the Greek, Italian and Iranian[4] were significantly lower than that of the present study. But the mean values of nasal length in the same population group were significantly higher than that of the present study.

The mean values of facial height of the Andaman[10] and Garo Bangladeshi[3] were significantly higher than that of the present study. In contrast the mean values of nasal length of the Andaman[10] and Garo Bangladeshi[3] were significantly lower than that of the present study.

The Czech people have significantly higher value of both facial height and nasal length in comparison with the population of the present study.

Evidence of positive correlation was found between facial height and nasal length in the above mentioned different populations. Similar positive correlation have been found in this study.

It can be concluded from the findings of different studies that dissimilarities exist in results. Variations are due to variation in race, nutritional status and measurement procedures.

Conclusion

Practicable, convenient and cost effective photographic method can be made popular in measuring facial dimensions. The method can be used to develop an anthropometric baseline data of different age groups, sex and ethnicity. This data might also help the surgeons in diagnosing and treating reconstructive cases.

References

1. Bozkir M G, Karakas P, Oguz O. Vertical and horizontal neoclassical facial canons in Turkish young adults. Surg Radiol Anat. 2004; 26:212-19
2. Sohail ASM, Bhattacharya P. Detection of facial feature points using anthropometric face model. Concordia University, 2006[cited 2010 May 20]; p.656-665. Available from: URL: http:// repository.gunadarma.ac. id:8000/f23-12.pdf
3. Akther Z. Study of the craniofacial measurement and their relationships with each other and with the stature in Christian Garo adult females. Thesis (M.Phil): Bangabandhu Sheikh Mujib Medical University, Dhaka 2009.
4. Farkas LG, Katic MJ, Forrest CR. International anthropometric study of facial morphology in various ethnic groups/races. Journal of Craniofacial Surgery, 2005; 16(4): 615-646. Available from: URL: http:// 74.6.239.67/ search [cited 2010 May 12]
5. Jasuja OP, Singh J, Main M. Estimation of stature from hand and phalangeal length. J of Ind asso of foren Med, 2004; 26(3): 100-106. Available from URL:http//www.medind.nic.in/ jal/t04/i3/jalt04i3p100.pdf [cited 2011 Feb 18]
6. Luximon Y. The Chinese face: a 3D anthropometric analysis. 2010 *TMCE*[online], [11 screen].
7. Ramanathan N, Chellappa R. Modeling age progression in young faces. CVRP, 2006. Face and Gesture recognition network: FG-NET aging database [online] Available from: http/sting.cycollege.ac.cy/ alanitis/fgnetaging/ [cited 2010 Sep 4]
8. Race(classification of humans). Available from: URL:http://en.wikipedia.org/wiki/ Race_(classification_of_humans) [cited 2010 May 12]
9. Bengal. Available-from:URL-http://en.wikipedia. org/wiki/Bengal) [cited 2010 May 12]
10. Pandey AK. Cephalofacial variation among Onges. Anthropologist [online]. 2006[cited 2010 Jun 4]; 8(4): 245-249. Available from: URL: http:// www.krepublishers.com/02.