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Correlation of Stature with Face Height and Breadth in Bangladeshi Adult Garo Male

Anamul Kabir[1], Effat Zerin Epsi[2], Suny Ajmery[3], Sumaya Farjan[4], Muntasir Ahmed[5], Shah Md. Atiqul Haque[6]

Abstract

Objective: *Objective of the study is to find out the correlation of physiognomical face height, morphological face height & maximum facial breadth with stature in Bangladeshi adult Garo male.*

Materials & Methods: *A cross sectional analytical type of study was carried out at different areas of Mymensingh, Bangladesh on the face of Garo male within the age of 25-45 years. The linear measurements were taken by digital vernier caliper & spreading caliper. Data were tabulated and statistically analyzed using Microsoft excel and SPSS software. Correlation among physiognomical face height, morphological face height & maximum facial breadth with stature was observed by using Pearson's Correlation Coefficient test.*

Results: *The mean physiognomical face height, morphological face height & maximum facial breadth were found 19.61 ±1.09 cm, 11.94 ±0.66 cm & 14.38 ±0.94 cm respectively. The mean stature was found 160.17 ±6.86 cm. The physiognomical face height & the morphological face height had significant positive correlation with stature but maximum facial breadth showed non-significant correlation with the stature in Garo male.*

Conclusion: *Regression analysis shows stature has significant positive correlation with physiognomical face height and morphological face height.*

Key words: *Stature, Garo, nasion, gnathion, trichion, zygion, physiognomical face height, morphological face height & maximum facial breadth.*

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Introduction

Estimation of stature is a very important indicator of growth and development and is used in clinical settings for nutrition and health research. Stature is an important parameter to calculate basal energy expenditure, body mass index, basal metabolic rate, body composition and estimations of nutrient requirements.[1] To estimate approximate structure of an unknown individual from any single bone is always a difficult task for an anthropologist and forensic examiner. Every part of human body is unique in itself as every part of the body is different in its own way from a similar part in another part of body though there is relationship between each part of the body and whole body. In this aspect, cranial length and cranial breadth provides an opportunity for estimating stature of an unknown individual. In 1984, the very first time, Dwight estimated stature from skeleton by anatomical way.[2]

Bangladesh is a pluralistic society where people from different religions, races and castes have been living together since time immemorial. Among 30 ethnic minority groups living in different parts of the country, the "Garo" is one of the larger marginalized ethnic minority groups in Bangladesh. This matriarchal community differ noticeably from the rest

[1]Associate Professor, Department of Anatomy, Jahurul Islam Medical College.
[2]Associate Professor, Department of Anatomy, Mymensingh Medical College.
[3]Associate Professor, Department of Pharmacology, Jahurul Islam Medical College.
[4]Associate Professor, Department of Anatomy, Khulna City Medical College.
[5]Associate Professor, Department of Anatomy, Netrokona Medical College.
[6]Assistant Professor, Department of Anatomy, Mymensingh Medical College
Correspondence: Dr. Anamul Kabir, Contact No: 01745118819, E-mail: anamulkabir@gmail.com

of the population in term of their appearance, language, religion and social organization.[3]

Nasion is the midpoint of the frontonasal suture. Trichion is the midpoint of the hairline. Gnathion is the lowest point in the midline on the lower border of the chin**.** Zygion is the most lateral point on each side of the zygomatic arch. Physiognomical face height is the linear distance between the trichion and gnathion. Morphological face height is the linear distance between the nasion and gnathion. Maximum facial breadth is the distance between the zygions.[4]

Many studies have already been done showing correlation of stature with long bones. The present study was designed to establish standard measurements of cranial length, cranial breadth and correlate them with stature of Bangladeshi adult Garo male.

Materials & Methods

The study was observational and cross-sectional in nature with both descriptive and analytical components. The study was carried out at different areas of Mymensingh (Mymensingh Sadar, Haluaghat, Madhuopor) and the period was from January, 2016 to June, 2016. The participants were 25-45 years aged 121 Bangladeshi Garo male residing in different areas of Mymensingh. They were without any history of acquired or genetic craniofacial anomalies.

Measurements were taken from the front of the participant, sits in erect posture with head oriented in the Frankfort Plane and arm hanging at sides. The tips of the spreading caliper were held between the thumb in front and the index fingers behind, with the curved arm resting on the flexed middle and fourth fingers.

For measuring the morphological face height, the digital slide caliper was held vertically with the fixed arm below with the inner edge of the fixed arm was placed to the gnathion, holding it in place with the thumb and index fingers. The movable arm was slide up to the nasion of the participant's nose and reading was taken.[5,6]

Fig.-1: *Procedure of measuring morphological face height (A) and physiognomical face height (B)*

For measuring the physiognomical face height, the one of the tips of spreading caliper was placed at the gnathion and holding it in place with the thumb and index fingers. The other tip spread upwards and was placed to the trichion and reading was taken.[5,6]

For measuring the maximum facial breadth, the maximum convexity of the zygomatic arch was felt with the tips of the index fingers tracing from the tragion and the caliper was placed on the arches with enough pressure to feel the bone. The digital slide caliper was moved back and forth and up and down until the scale showed the maximum reading.[5,6]

Fig.-2: *Procedure of measuring the maximum facial breadth*

Stature is the vertical distance from a standing surface to the vertex of the head and was measured with a stadiometer. The subject stands erect with the head in the Frankfurt plane**.** The heels were together with the weight distributed equally on both feet. The shoulders and upper extremities were relaxed. The measurement was taken at the maximum point of quiet respiration. Data were tabulated and statistically analyzed using Microsoft excel and SPSS software, version 21. Correlation between facial length and breadth with stature was done by using Pearson's Correlation Coefficient test. P-value <0.05 was considered as statistically significant.

Result

The physiognomical face height of 101 Garo male of 25 to 45 years age ranged from 17cm to 22 cm. More than 66% respondents were measured within the range of 19 cm to 21 cm. The morphological face height of 121 Garo male of 25 to 45 years age ranged from 10.36 cm to 13.75 cm. More than 85% respondents measured within the range of 11cm to 13 cm. The maximum facial breadth of 121 Garo male of 25 to 45 years age ranged from 11.88cm to 15.88 cm. More than 69% respondents measured within the range of 14cm to 16cm.

Table I

Linear measurements of the face of Garo Male

Variables (cm)	Mean ± SD (Range)
Physiognomical face height	19.61 ± 1.09 (17 – 22)
Morphological face height	11.94 ± 0.66 (10.36 – 13.75)
Maximum facial breadth	14.38 ± 0.94 (11.88 – 15.88)

Table II

Measurements regarding stature of Garo male

Variables (cm)	Mean ± SD (Range)
Stature	160.17 ± 6.86 (144 – 178)

The stature of 121 Garo males of 25-45 years age ranged from 144 cm to 178 cm. More than 86% of the respondents measured between 150 cm to 170 cm.

Table III

Result regarding correlation between stature with face height and face breadth

Variables	Correlation with stature		
	Coefficient of determination (r^2)	Correlation coefficient (r)	P value
Physiognomical face height	0.55	+0.74	0.000^{**}
Morphological face height	0.50	+0.71	0.000^{**}
Maximum facial breadth	0.01	+0.10	0.242^{ns}

Correlation between stature with face height and face breadth was done by Pearson correlation coefficient test
** = Significant at P < 0.01 (2-tailed), ns = Not significant at P > 0.05

Physiognomical face height showed a significant positive correlation (r=0.74, P=0.000) with the stature in Garo male (Figure 3).

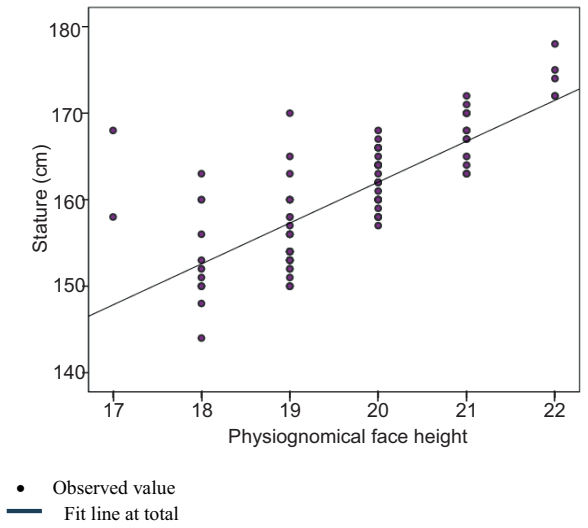

Fig.-3: *Scatter diagram showing significant positive correlation between the stature and the physiognomical face height in Garo male*

Morphological face height showed a significant positive correlation (r=0.71, p=0.000) with the stature in Garo male (Figure 4)

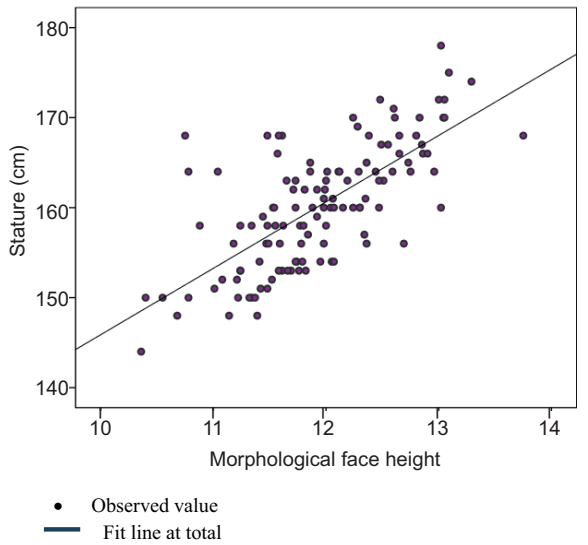

Fig.-4: *Scatter diagram showing significant positive correlation between the stature and the morphological face height in Garo male.*

Maximum facial breadth showed a non-significant correlation (r=0.10, p=0.242) with the stature in Garo male

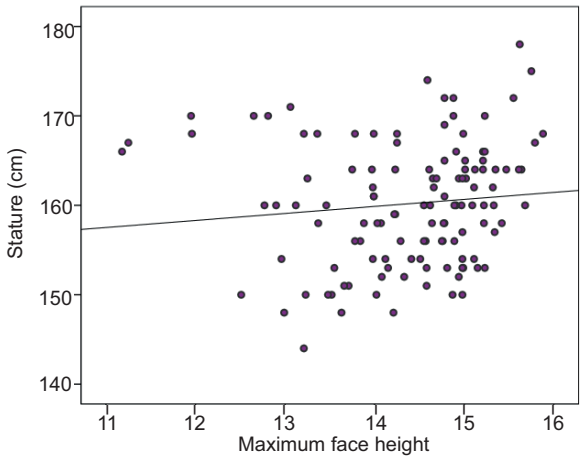

Fig.-5: *Scatter diagram showing nonsignificant correlation between the stature and the maximum facial breadth in Garo male*

Discussion

According to the present study, in Garo male the mean physiognomical face height was 19.61**±**1.09 cm. The mean physiognomical face height was almost identical to healthy Iranian young adults[7], Malaysian population and Malaysian Chinese.[8] While it was higher than population of Latvian & non-Latvian residents[9], North American White Young Adult Population and Azerbaijan males[10], Onges male.[11]

The current study shows the mean morphological face height was 11.9**±**0.66 cm. The mean morphological face height was lower in north Indian adult population[12], Gujarat male[13], Onges[11], Hausa and Yoruba population[14] than the value of present study. The current study findings were almost similar to Azerbaijan white young adult male population[10], Serbian population.[15]

In the present study, the mean maximum facial breadth was 14.38±0.94 cm. Malaysian Chinese and Malaysian Indian[7], Latvian & non-Latvian residents[9], North American white young adult[10], Boston University students were almost alike the mean value of the Bangladeshi Garo male.[16] The Garo males of the present study was found to have

a mean value almost similar to Garo population of another region of Bangladesh which was conducted by Ferdousi A.[5] Whereas Onges population[11], Gujarat population[13], population of central Serbia[15], Turkish healthy adults[17] and Pune population[18] have shorter mean value than the mean value of the Bangladeshi Garo male. But Azerbaijan males[10] bear slightly larger mean value than Bangladeshi Garo male.

The mean value of stature in Garo male was 160.17±6.86. This mean value was lower than that of the populations of Native America[19], Onges, India[11] but higher than North Indian adult population[12]. The current study was almost similar to Hausa and Yoruba population[20] in Nigeria.

The result of present study shows some similarities and dissimilarities with the result of other researchers which may be due to the selection of study population of various ethnicity, age, race or geographical location. Dissimilarities also might be due to the use of different techniques of measurement.

Conclusion

The measurements of physiognomical face height, morphological face height, maximum facial breadth & stature would be useful in the field of anatomy, anthropology, archeology, sports science and ergonomics.

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