Lower Jaw and Orolabial Analysis in Adult Bangladeshi Buddhist Chakma Females

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Abstract

Background: It is well accepted that a single standard of craniofacial norms is not appropriate for application to diverse racial and ethnic groups, even for different sex and ages in same ethnic group. So it is necessary to develop craniofacial norms for different groups based on above factors. The present study was designed to establish the baseline measurements of the lower jaw and orolabial anthropometrical parameters and indices, and also to evaluate the differences (if any) on age related morphological variations of adult Bangladeshi Buddhist Chakma females. **Methods:** The study was descriptive, observational and cross-sectional in nature with some analytical components. The study group consisted of a convenient sample of 100 adult Bangladeshi Buddhist Chakma females; categorized into two groups – 25 to 35 years (n = 70) and 35 to 45 years (n = 30). Variables were measured using physical and photographic procedures. Indices were calculated from those variables. An independent "t" test was performed to evaluate if there was any significant difference in measurements between the two age groups setting a p value of ≤ 0.05 as statistically significant. **Results:** All measurements show statistically non significant difference between two age groups except philtrum length ($p = 0.02$) and upper vermilion height to philtrum length index ($p = 0.03$). **Conclusions:** The result of this study can be useful for anatomists and anthropologists to serve as a basic framework for estimating the standard of lower jaw and orolabial dimensions of this population and also to compare the craniofacial dimensions of other ethnic groups of Bangladesh with this ethnic group.

Key words: Anthropometry; Orolabial anthropometry; Bangladeshi chakma females.

INTRODUCTION

Variation in different morphological characters is one of the most important phenomena occurring in human and is attributed to many factors such as mutation and natural selection. The dimensions of the human body are affected by ecological, biological, geographical, racial, gender and age factors. So, anthropometric measurements as a mean of studying variations of human population should be based on above factors. This necessity rests on the fact that there will be greater validity if an individual is compared to referent data matched for their specific ethnic group, sex and age.

Lower jaw and orolabial anthropometry can be useful for quantitative evaluation of dysmorphic syndromes. Morphological features of various syndromes are usually described on the basis of qualitative method, which is subjective and clinical impression can be misleading[1]. Even among specialists, there is often disagreement with respect to minor anomalies[2]. Such problems will overcome if craniofacial measurements taken from a patient compared with the normal values obtained from a reference population.

Lower jaw and orolabial anthropometry can also be used in plastic and reconstructive surgery, oral surgery and dentistry. To treat any congenital or post-traumatic disfigurements in members of different ethnic groups successfully, surgeons require access to the normative measurements of that group[3] for precise determination of the degree of deviations from the normal and to assess any improvement achieved through treatment[4].

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It is reported by various researchers that facial dimensions continue to modify during adulthood, even after complete biological maturation[5]. As no published data are available at present, it is necessary to standardize the normative value of lower jaw and orolabial measurements for this ethnic group. Therefore, the present study was designed to establish the baseline measurements of the lower jaw and orolabial anthropometrical parameters and indices, and also to evaluate the differences (if any) on age related morphological variations in lower jaw and orolabial region of the adult Bangladeshi Buddhist Chakma females that may be necessary for future reference in these regard.

MATERIALS AND METHODS

Study design

The study was descriptive, observational and cross-sectional in nature with some analytical components.

Study settings

The study group consisted of a convenient sample of 100 adult Bangladeshi Buddhist Chakma females; categorized into two groups – 25 to 35 years (n = 70) and 35 to 45 years (n = 30). Subjects excluded from the study were those - mixed in origin, history of congenital craniofacial anomaly, major craniofacial trauma, orthodontic treatment, craniofacial reconstructive surgery and had craniofacial deformities or irregular dentitions.

Variables studied

a. Variables studied through physical procedures (Figure 1)
   i. Mandible height (Stomion / sto - Gnathion / gn)
   ii. Mandible breadth (Gonion / go - Gonion / go)
   iii. Mouth width (Cheilion / ch - Cheilion / ch)

b. Variables studied through photographic procedures (Figure 1)
   i. Upper lip height (Subnasale / sn – Stomion / sto)
   ii. Lower lip height (Stomion / sto – Sublabiale / sl)
   iii. Upper vermilion height (Labiale superius / ls – Stomion / sto)
   iv. Lower vermilion height (Stomion / sto – Labiale inferius / li)
   v. Philtrum length (Subnasale / sn – Labiale superius / ls)
   vi. Philtrum width (Crista philtri / cph – Crista philtri / cph)

c. Calculated variables
   i. Mandibular index (sto-gn / go-go x 100)
   ii. Upper lip height to Mouth width index (sn–sto / ch-ch x 100)
   iii. Lower lip height to Upper lip height index (sto–sl / sn–sto x 100)
   iv. Lower vermilion height to Lower lip height index (sto–li / sto–sl x 100)
   v. Upper vermilion height to Philtrum length index (ls–sto / sn–ls x 100)
   vi. Philtrum width to Mouth width index (cph–cph / ch-ch x 100)

Procedures of measuring the variables studied

To avoid accidental injury of the labial region, photographic procedure was used which had been shown a valid alternative of manual anthropometry provided that the images had been captured in a standardized fashion and the points chosen were easily identifiable[4,6]. Before taking the physical measurements and frontal facial photograph, all facial jewelry was removed from the subject[7] and was asked to maintain a neutral, relaxed facial expression with mouth closed naturally. Photographs were taken with a digital camera, at a 7.2 megapixel resolution, under the same lighting conditions using flash mode from a fixed distance of 4 feet using zoom function[7]. All the photographic measurements were taken in a computer program named adobe illustrator version-10.

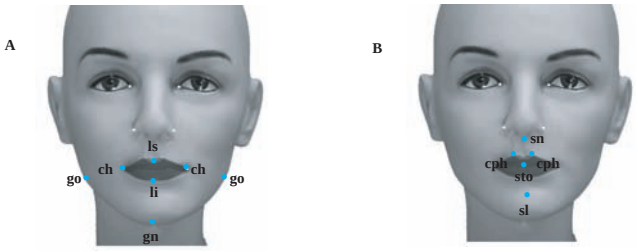

Figure 1 : Diagrammatic representation of some important craniofacial anthropometric landmarks in frontal (A, B) views of manikin

gn = Gnathion
go = Gonion
ch = Cheilion
ls = Labiale superius
li = Labiale inferius
sl = Sublabiale
cph = Crista philtr
sto = Stomion
sn = Subnasale

The physical measurements and facial photographs were taken at a fixed time between 9 AM and 5 PM to eliminate the discrepancies due to diurnal variations[8]. All the measurements were taken twice to control for measurement error. The final value that was used for the study was the average of the two obtained values. A third reading was taken if the initial two measurements showed a major discrepancy and the two closer readings would then be used[9,10].

Data processing and analysis

After collection of the data, their frequency distributions, central tendencies and dispersions were determined using SPSS version 12. An independent "t" test was performed to evaluate if there was any significant difference in measurements between the two age groups setting a p value of < 0.05 as statistically significant.

RESULTS

Range, mean ± SD and p value of the measurements are shown in Table 1 and 2. These tables also show statistically non significant difference between two age groups in all measurements except for philtrum length and upper vermilion height to philtrum length index.

Table 1: Measurements of lower jaw and orolabial region obtained through physical or photographic procedures

Variable	Age group (years)	Range (cm)	Mean (cm) ± SD	p value*
Mandible height	25 – 35	3.59 - 5.34	4.51 ± 0.36	0.25 (NS)†
	35 - 45	3.63 - 5.36	4.41 ± 0.43	
Mandible breadth	25 – 35	9.80 - 11.60	10.50 ± 0.45	0.35 (NS)
	35 - 45	9.80 - 11.40	10.59 ± 0.42	
Mouth width	25 – 35	3.88 - 5.29	4.57 ± 0.31	0.33 (NS)
	35 - 45	3.93 - 5.34	4.64 ± 0.34	
Upper lip height	25 – 35	1.59 - 2.69	1.96 ± 0.19	0.24 (NS)
	35 - 45	1.61 - 2.62	2.02 ± 0.26	
Lower lip height	25 – 35	1.05 - 1.95	1.46 ± 0.19	0.39 (NS)
	35 - 45	1.08 - 1.99	1.50 ± 0.21	
Upper vermilion height	25 – 35	0.47 - 1.05	0.76 ± 0.12	0.21 (NS)
	35 - 45	0.39 - 1.16	0.73 ± 0.16	
Lower vermilion height	25 – 35	0.65 - 1.41	0.99 ± 0.16	0.31 (NS)
	35 - 45	0.49 - 1.23	0.96 ± 0.20	
Philtrum length	25 – 35	0.69 - 1.76	1.21 ± 0.21	0.02 (S)**
	35 - 45	0.97 - 1.88	1.33 ± 0.23	
Philtrum width	25 – 35	0.59 - 1.38	1.02 ± 0.19	0.85 (NS)
	35 - 45	0.74 - 1.46	1.03 ± 0.16	

* p>0.05, the result was considered as non-significant † NS = Non-significant **S = Significant

Table 2: Measurements of calculated lower jaw and orolabial indices

Craniofacial index	Age group (years)	Range (cm)	Mean (cm) ± SD	p value*
Mandibular index	25 – 35	33.28 - 54.50	43.02 ± 4.18	0.13 (NS)†
	35 - 45	32.96 - 50.19	41.66 ± 3.92	
Upper lip height to Mouth width index	25 – 35	33.33 - 57.58	43.16 ± 5.05	0.68 (NS)
	35 - 45	35.42 - 57.06	43.63 ± 5.65	
Lower lip height to Upper lip height index	25 – 35	45.72 - 93.64	74.97 ± 10.50	0.99 (NS)
	35 - 45	52.94 - 94.09	74.95 ± 11.02	
Lower vermilion height to Lower lip height index	25 – 35	43.60 - 93.69	68.44 ± 10.21	0.09 (NS)
	35 - 45	28.00 - 87.79	64.27 ± 12.57	
Upper vermilion height to Philtrum length index	25 – 35	30.72 - 128.99	65.85 ± 20.12	0.03 (S)**
	35 - 45	26.35 - 103.57	56.65 ± 17.31	
Philtrum width to Mouth width index	25 – 35	12.64 - 32.60	22.32 ± 4.12	0.88 (NS)
	35 - 45	16.73 - 34.89	22.18 ± 3.60	

***** p>0.05, the result was considered as non-significant
† NS = Non-significant
******S = Significant

DISCUSSION

When craniofacial anthropometry was introduced into clinical practice to quantify changes in the craniofacial framework, features distinguishing various races or ethnic groups were discovered[3]. So it is accepted that a single standard of facial aesthetics is not appropriate for application to diverse racial and ethnic groups[11]. Moreover, differences in craniofacial norms across different ages have also been documented. Therefore, there is a need to develop craniofacial norms for different age groups as well. This necessity rests on the fact that there will be greater validity if an individual is compared to referent data matched for their specific ethnic group and age. The participants included in this study were from southern part of Bangladesh (Chittagong and Rangamati cities).

In general, the present data were satisfactorily in concurrence with previous reports. For example, the mandible breadth of Chakma females was almost similar to Santhal[12], Manchu[13], Evenks[14], Mongol[15], Korean[16] females.

Three-dimensional data collected by digital indirect anthropometry were reported by Sawyer et al.[17] for adult Caucasian and by Sforza et al.[18] for white Italians. In comparison some values were larger some were smaller than the current ones. Such difference may be due to difference in technique. The present study use photographic indirect anthropometry while Sawyer et al.[17] used stereophotogrammetry and Sforza et al.[18] used computerized electromagnetic digitizer. Besides these, ethnicity of the sample was also different.

In a study Sforza et al.[18] shows that the dimensions of the lips and orolabial region modify between young adulthood and adult up to eighth decade of life. But in this study except for philtrum length and upper vermilion height to philtrum length index such significant modification could not evaluate. The present study was a cross sectional in nature, so it may not represent the actual growth pattern of lips and orolabial region. However, only a few longitudinal studies showed age related significant modifications in lips and orolabial region.

LIMITATIONS

The subjects were selected from a convenient sample & also relatively small as compared to the total number of population. Besides this, it is a cross-sectional study. So, a longitudinal study on a larger sample is required to confirm the findings of this study.

CONCLUSION

The result of the present anthropometric study can be useful for anatomists and anthropologists to serve as a basic framework for estimating the standard of lower jaw and orolabial dimensions of this population and also to compare the craniofacial dimensions of other ethnic groups of Bangladesh with this ethnic group.

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