Comparison of Craniofacial Profiles Evaluation of Bangladeshi Adults by Lateral Cephalometry With Down's Analysis

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Abstract

Objective: *To carry out a study on comparison of craniofacial profiles evaluation of Bangladeshi adults by lateral cephalometry with Down's analysis.*

Materials & Methods: *To evaluate a morphometric norm of Bangladeshi population by strainers methods of lateral cephalometric parameter, 112 cephalographs of Bangladeshi young adults (56 male, 56 female) were selected and evaluated with Down's analysis on nine angular and one linear measurement.*

Results: *The study shows increased value of Angle of convexity, AB plane angle, Mandibular plane angle, Y-axis, L1 to Mandibular plane, L1 to occlusal plane, U1 to AP plane (mm) and decreased value of Facial angle, Cant of occlusal plane, and Inter-incisal angle.*

Conclusions: *Differentiation between Bangladeshi population value with that of Down's study explain the craniofacial pattern of this population which should be properly compared for diagnostic and therapeutic measure.*

Key Words: *Lateral Cephalometric radiographs, Down's analysis, Bangladeshi, Craniofacial evaluation.*

Introduction

Ethnical and racial variations of craniofacial morphometry among different populations have been reported by many researchers.[1]

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From an orthodontic point of view management of dento-alveolar and craniofacial structure always aims to attain a specific norm for a specific population [2]. After evaluation of lateral cephalometric radiograph with proper radiation exposure and standard technique, the use of cephalometric studies was introduced in classical anthropometry and today it is being constantly used in the evaluation of craniofacial variations[1].

The main goals of cephalometric analysis are to evaluate the dentofacial and skeletal relationship, of the five major functional components of the face: the cranium and the cranial base, the skeletal maxilla, the skeletal mandible, the maxillary dentition and the alveolar process, and the mandibular dentition and alveolar process[3]. Among the several numeric facial analyses currently employed, the analysis proposed by Down[4] has been broadly used by orthodontists and maxillofacial surgeons.

However, the measurement proposed for these analyses were achieved based on a white American sample and may not be applicable as references for diagnosis and treatment planning of other ethnic group. It is unscientific to use cephalometric norm of a specific racial group for another. It is important to have data concerning relevant human group for purposes of clinical diagnosis and planning of treatment. These data may also be useful in forensic dentistry.

The ethnic differences in facial profile and skeletal features should be considered during treatment, especially in orthodontics, maxillofacial surgery and prosthodontics where arch shape can be modified appreciably [5].

Therefore, the aim of this study was to evaluate the morphometric norm for Bangladeshi population. So far there is only one research[6] reported with lateral cephalometric radiograph by Down's analysis on Bangladeshi population among undergraduate dental school students. Therefore, our study was aimed to perform in a larger number of population with orthodontic complain and compare our study result with that of previous study with Down's analysis.

Materials and Methods
A cross sectional study was performed. The study subjects included 112 lateral cephalograms of Bangladeshi collected from the patients' record of Department of Orthodontics, Faculty of Dentistry, BSM Medical University and another two private orthodontic clinics of Dhaka, Bangladesh. The 112 radiographs (56 male and 56 female) were selected on the basis of having a harmonious face with a convex facial profile (from their photographic record), Angles[9] class I molar relationship with presence of all permanent teeth up to second molar (from their dental cast record), and without history of any type of previous orthodontic treatment (fixed/ removable/ functional). Their ages ranged from 16 years to 26 years with mean age of 19 (±2.13) years. Those entire lateral cephalometric radiographs were taken from a specific non-government diagnostic center of Dhaka, with a single operator with specific radiographic machine. The radiograph operator was instructed to record the lateral cephalometric radiograph when each subject position in the cephalostat with the head oriented to the Frankfort horizontal plane and the teeth in centric occlusion with lip relaxed. All those recored radiographs were traced manually and analysed by a single investigator to avoid the investigator error. Tracing was done on a systemic manner manually on A4 size tracing paper and 2B hard pencil with well illumination viewer. The image lines were traced without stopping or lifting the pencil, ereaser was avoided as much as possible.

Bilateral structures were first traced independently. An average was then drawn by dotted line with visual approximation (Figure 1). Then the interpretations were measured and evaluated by SPSS 17 for statistical analysis.
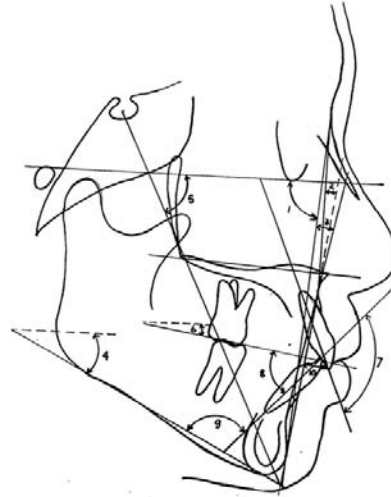

Figure 1: 1. Facial angle, 2. Angle of convexity, 3. A-B Plane, 4. Mandibular plane angle, 5. Y-axis angle, 6. Occlusal plane angle, 7. Inter-incisal angle, 8. Lower incisor to mandibular plane angle, 9. Lower incisor to occlusal plane angle, 10. Upper incisor to A-Pog (distance).

Results
The significance level for this study was set at $p < 0.05$ and highly significant at $p < 0.001$. The descriptive statistics were calculated for all lateral cephalometric radiographs to evaluate nine angular measurements and one linear measurement for the entire sample (112 subjects) from both genders of Bangladeshi population (Tables 1 and 2). For each variable, mean and standard of deviation (SD) were calculated. The p-values for all the comparisons were statistically not significant between genders. The means for Angle of convexity, AB plane angle, Mandibular plane angle, Y-axis, L_1 to Mandibular plane, L1 to occlusal plane, U1 to AP plane (mm) are higher among the Bangladeshi population compared to the Caucasians[4]. The means for Facial angle, Cant of occlusal plane, and Inter-incisal angle are lower among the Bangladeshi population than that of Caucasians[4] (Table 2).

Table 1: Craniofacial morphometric profiles of Bangladeshi population
(n=112)

Profiles	Gender	n	Mean	Combined Mean	Combined SD
Facial angle	M	56	87.12	86.88	1.41
	F	56	86.64		
Angle of convexity	M	56	3.22	3.12	0.62
	F	56	3.02		
A-B Plane angle	M	56	2.08	1.86	0.38
	F	56	1.64		
Mandibular plane angle	M	56	24.86	25.36	1.02
	F	56	25.86		
Y - axis	M	56	59.58	60.2	1.16
	F	56	60.82		
Cant of Occlusal Plane	M	56	9.08	9.2	0.68
	F	56	9.32		
Inter-incisal angle	M	56	122.16	121.94	2.18
	F	56	121.72		
L_1 to Mandibular plane	M	56	3.24	2.8	0.82
	F	56	2.36		
L_1 to Occlusal plane	M	56	20.74	20.18	1.14
	F	56	19.62		
U_1 to AP plane (mm)	M	56	3.5	3.18	0.84
	F	56	2.86		

Table 2: Comparison of craniofacial morphometric profiles of present study with Down's analysis

Profiles	Present study on Bangladeshi population (n=112)	Caucasian (n=20)
Facial angle	86.88	87.8
Angle of convexity	3.12	0
A-B Plane angle	1.86	-4.6
Mandibular plane angle	25.36	21.9
Y - axis	60.2	59.4
Cant of Occlusal Plane	9.2	9.3
Inter-incisal angle	121.94	135.4
L_1 to Mandibular plane	2.8	1.4
L_1 to Occlusal plane	20.18	14.5
U_1 to AP plane (mm)	3.18	2.7

Discussion

This investigation compared the mean value of craniofacial morphometric norm for Bangladeshi population by lateral cephalometric radiograph with Down's analysis. Increasing value of Angle of convexity, Mandibular plane angle, Y-axis with the decreasing value of Facial angle, Inter-incisal angle of present study on Bangladeshi population with that of Caucasian[4] population clearly explain the traditional broad western craniofacial appearance compared to short and mild protruded Asian craniofacial appearances of present study population. Other previous study on Bangladeshi population[6] also shows similar changing pattern of value from that of Caucasian population (Figure 2). Similar nature of changing craniofacial mean value observed in Saudi Arabian[8], Pakistani[9], Kuwaitis[10], and Israeli[11] populations.

The results of this study have clinical implications in the diagnosis and treatment planning of adult Bangladeshi patients. Skeletally, adult Bangladeshis demonstrated more bi-maxillary protrusion with a tendency to Class II facial pattern and low mandibular plane angle. Therefore, in the diagnosis and treatment planning of a Bangladeshi it seems more maxillary skeletal protrusion is acceptable than in a Caucasian within the limitation of our study. Dentally, Bangladeshi patients may be treated slightly more bi-maxillary protrusive than in Caucasian patients. Further investigation is needed to confirm this result on Bangladeshi population using a Digital radiograph avoiding manual tracing, which may be more accurate and representative of sample data norm of Bangladeshi population.
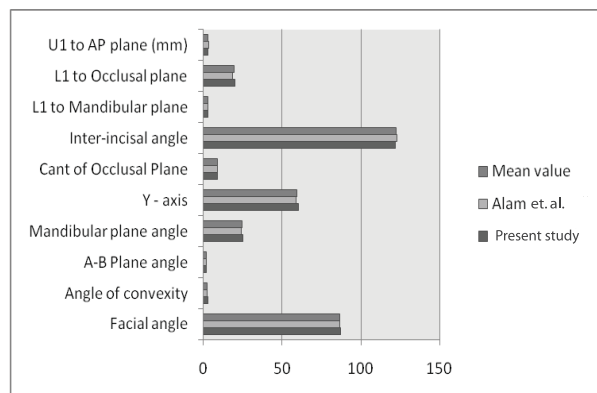

Figure 2: The bar diagram shows comparison of previous study with the present study on Bangladeshi population and the calculated mean value for Bangladeshi.

Conclusion

It is evident that, the norm of Bangladeshi craniofacial morphometry is quite different from that of the Caucasian norm recorded by Down.

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