



## Cephalometric Characteristics of Bangladeshi adults with Class II Malocclusion

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### Abstract

*This study evaluating the craniofacial characteristics of Bangladeshi adults with class II malocclusion in order to frame cephalometric angular and linear measurements and to relate their mean differences with the established values of class I Bangladeshi adults' cephalometric norms. Fifty (50) standardized lateral cephalometric radiographs of Bangladeshi adults including 25 males and 25 females with an average age of 20 years were studied. The conditions of selection were Class II incisor relationship with or without crowding, no deformity and no previous orthodontic treatment. All cephalometric landmarks were located and determined and subsequently tracings were done to execute cephalometric analysis. The results of the existing study revealed, there is no statistically significant difference between the genders on all measured values. Bangladeshi males showed larger values than those of the Bangladeshi females in most of the variables. Mean values of cephalometric norms of Bangladeshi adults were very much different than the Class I malocclusion adults. The reading should be kept in attention for this group separately as it varies from the class I Malocclusion.*

**Keywords:** Class II malocclusion, cephalometric radiographs, cephalometric norms, Bangladeshi adult.

### Introduction

A comprehensive awareness of the skeletal and dental components that contribute to a specific malocclusion is essential because these rudiments may influence the method to treatment.

A number of cephalometric surveys were explored for various ethnic assemblies and stated in the literature<sup>1-3</sup>. The distinction in dentofacial arrangement of various racial and ethnic groups has been observed by several investigators in European<sup>4</sup>, Japanese<sup>4</sup>, African<sup>5</sup>, Mongolian<sup>6</sup>, Korean<sup>6</sup>, Indian<sup>7</sup>, Malay<sup>8</sup>, Malaysian Indian<sup>9</sup> and Malaysian Chinese<sup>10</sup>, and Bangladeshi<sup>11-18</sup> populations.

Class II malocclusion is a frequently seen disharmony that has been the matter of intention and keen to many researchers. Both patients and their parents pay concern because of the excessive overjet. Many researchers came to a conclusion that diverse combinations of skeletal and dental fundamentals are drawn into produce class II malocclusion. The etiology of class II malocclusion is an interesting subject and there is still much to be explained and agreed.

Cephalometric study is taken to categorize the etiological feature which may be related with class II malocclusion. Cephalometric inquiry usually can be either performed by various angular or linear measurements. Different ethnic group made the different average norm in different variables of cephalometry for the malocclusions and follow the treatment using their own norms.

The purpose of this study was to investigate the craniofacial characteristics of Bangladeshi adults with class II malocclusion in directive to express cephalometric linear and angular dimensions and to associate their mean variances with the proven values of class I Bangladeshi adults' cephalometric norms.

### Material and Methods

A total of 50 lateral cephalograms of Bangladeshi adult (25 males and 25 females) average age of both the male and female groups was 20 years were selected from the students and dental patients who fulfilled the following requirement:

Class II incisor relationships, which according to the British Standards Institute<sup>19</sup> (lower incisor edges occludes below the cingulum plateau of the upper central incisors, No orthodontic treatment, Teeth present from second molar to second molar, No anomaly, Both crowded and non-crowded incisors were included, Mutually paternities and ancestors being Bangladeshis without any multi-ethnic nuptial.

The study period was from April 2008 to April 2011. The cephalometric landmarks of linear and angular measurement are shown in figure-1 and table-1. Each subject was positioned in the cephalostat with the head oriented to the Frankfort horizontal plane and the teeth in centric occlusion position with the lips relaxed. All radiographs and tracings were done by a single investigator. Tracing was done in a standard manner.

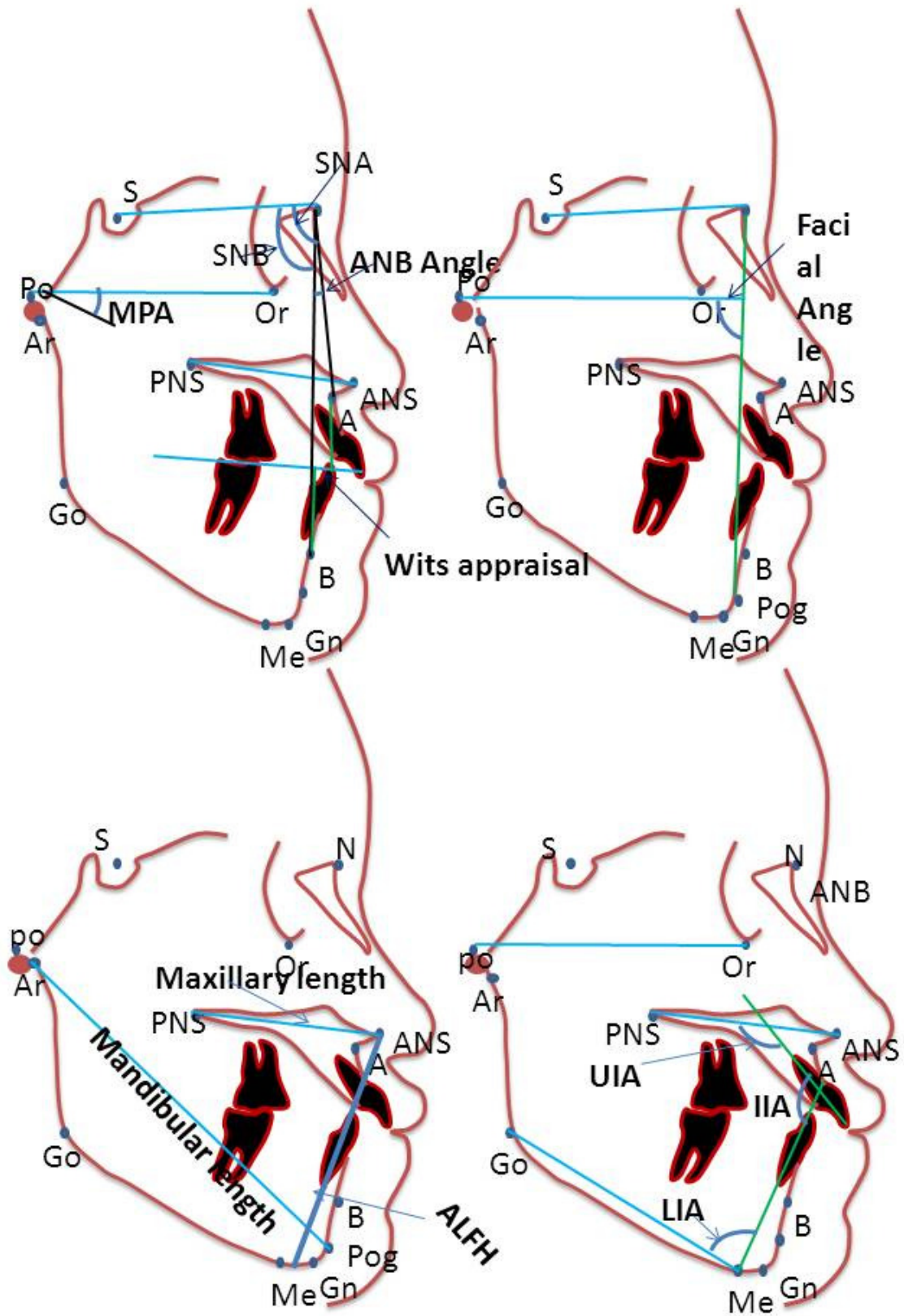


Figure-1  
Linear and angular cephalometric measurements

**Table-1**  
**Landmarks/variables of Bangladeshi adults in Class II malocclusion**

variables	Explanation
SNA	angle between Sella-Nasion and Nasion - A point
SNB	angle between Sella-Nasion and Nasion - B point
ANB	SNA minus SNB
Wits	distance along functional occlusal plane
Facial angle	inferior inside angle between Frankfort Horizontal plane and facial line
Maxillary length	line connecting between Anterior Nasal Spine and Posterior Nasal Spine
Mandibular length	line connecting between Articulare (Ar) to Pagonian (Pog)
UIA	angle between Maxillary incisors long axis and Frankfort Horizontal plane
LIA	angle between Mandibular incisors long axis and Mandibular plane
IIA	angle between the long axis of the Maxillary and Mandibular incisors
ALFH	Line from Anterior Nasal Spine to Menton
MPA	angle between the Mandibular Plane and the Frankfort Horizontal plane

**Control of Error:** Radiograph of 20 cases randomly selected from malocclusion group were traced and digitized a 2<sup>nd</sup> time after an interval of one month apart. The method error was analyzed by the Dahlberg’s formula:

$$ME = \sqrt{\sum(x_1-x_2)^2/2n} \quad (1)$$

Where x1 is the first measurement, x2 the second measurement and n the number of repeated records<sup>20</sup>.

**Statistical Analysis:** The standard deviation and mean for each measurement were considered using Statistical Package for Social Sciences (SPSS 19, Chicago, USA). The variables in the two groups were compared using the independent t-test where confidence level set at 5% (p<0.05).

### Results and Discussion

To assess tracing errors, films are retraced 1 month apart. The method error was calculated using Dahlberg’s formula. The error did not exceed 0.67 mm for the linear variables, 0.73 degree for the angular variables. The combined error for any of the variable was small and considered to be within acceptable limit<sup>21</sup>.

Table-2 showed statistics between the two sexes using t-test of cephalometric measurements. Table-3 presents a comparison

between class II values and class I mean established values according to previous researchers<sup>9,12-15</sup>.

**Table-2**  
**Mean values of Bangladeshi male and female adult with Class II malocclusion**

Variables	Male		Female		p value
	Mean	SD	Mean	SD	
SNA	83.90	3.47	84.10	3.56	0.43
SNB	78.50	3.06	78.20	3.77	0.86
ANB	5.22	1.66	4.88	1.71	0.31
Facial angle	84.10	3.40	84.30	3.60	0.93
Maxillary length	59.30	2.30	59.70	2.22	0.66
Mandibular length	70.40	3.80	70.30	3.30	0.78
UIA	116.40	4.44	115.60	3.70	0.33
LIA	93.54	2.40	92.60	2.56	0.43
IIA	115.78	6.20	115.67	5.70	0.90
ALFH	73.12	3.10	73.09	3.05	0.78
MPA	24.30	3.60	24.20	3.76	0.92

The current study came to a conclusion that different variables like SNA, SNB, ANB, Facial angle, Facial Mandibular length, UIA, LIA, IIA, ALFH, MPA, Wits appraisal exhibited the variation in mean differences between the class II malocclusion and Class I normal occlusion of Bangladeshi adults table-3.

**Table-3**  
**Mean differences between Class II malocclusion and Class I normal occlusion of Bangladeshi adults**

Variables	Class II	Class I (Alam et al. 2012 and 2013)	Mean difference
SNA	84	82.175	1.825
SNB	78.35	79.765	-1.415
ANB	5.05	2.41	2.64
Facial angle	84.2	86.349	-2.149
Maxillary length	59.5	58.84	0.66
Mandibular length	70.35	70.825	-0.475
UIA	116	104.885	11.115
LIA	93.07	91.685	1.385
IIA	115.725	125.075	-9.35
ALFH	73.105	73.255	-0.15
MPA	24.25	24.24	0.01

Between the genders in all measured values showed there is no statistically significant difference and almost all variables Bangladeshi females showed smaller values than Bangladeshi males table-2.

**Discussion:** The skeletal, facial, racial characteristics of the patients show an important role in orthodontic treatment planning. Present study appraises to establish the norms of the cephalometric features of class II malocclusion in Bangladeshi population. Many studies have been done to find out the norms and cephalometric characteristics in different population.

Naphtali Brezniaket *al.* surveyed 50 samples with class II div 2 malocclusion according to Angle's original criteria and compared the findings with class I malocclusion. That study concluded that compare to class I and class II div 2 characteristic showed the maxilla is orthognathic, chin relatively prominent, overbite is deep, mandible relatively short, the upper central incisors are retroclined and the facial pattern is hypo divergent<sup>22</sup>.

Pancherz *et al.* compared dentoskeletal morphology in class II div 1 and class II div 2 malocclusions with the help of lateral cephalogram. This study showed that there is no basic variance between dento skeletal morphology subsists between class II div 1 and class II div 2 malocclusions but the position of maxillary incisors<sup>23</sup>.

Rosenblum assumed to assess maxillary prognathism or mandibular retrusion is the cause for class II malocclusion. He found that only 27% of the sample ensured mandibular retrusion and 56.3% of the sample ensured maxillary protrusion<sup>21</sup>. While other studies showed that, in relation to the cranial base mandible is retrusive while the maxilla was in normal position<sup>24, 25</sup>. Some studies also indicated that both maxillary prognathism and mandibular retrusion is responsible for class II skeletal pattern<sup>26</sup>. In relation to age and sex the dimorphism exist among various racial clusters with lot of disparities in assessment of head morphometric measurement<sup>27</sup>.

Hassan also examined lateral cephalogram to compare the class II div 1 and normal occlusion in Saudi population living in western region and concluded that the mandible and lower incisors are normally positioned in relation to the cranial base while the maxilla and the incisors are protruded<sup>28</sup>.

To establish the specific craniofacial features of class II division 1 malocclusion patients, non-growing cephalometric study had done and concluded that maxilla is normally positioned in class II division 1 patients however the mandibles were positioned posteriorly, small in size and when compare to class I controls mandible is rotated open. There is no difference of the position and inclination of the class II division 1 patients and class I control group but mandibular incisors were more protrusive<sup>29</sup>.

Comparing the English children of class II division 1 and class I occlusion found that the main difference between them are higher maxillary-mandibular plane angle, protruded maxillary incisors and shorter mandible for the former group<sup>30</sup>.

Another study has done comparing the class II division 1 malocclusion with or without deepbite with normal occlusion. With the deepbite result showed that discrepancy in length between the quantities of the two jaws, distal relationship between point A and pogonion and a distal relationship between point A and B. And without the deepbite result showed that a long mental process, distal relationship between point A and B and small angle between the nasal plane and the anterior cranial base<sup>31</sup>.

In relation to the findings of current study, it is obvious that there are some ultimate differences in the craniofacial structure of Bangladeshi adults. These variances should be kept in consideration to aid healthier diagnosis and treatment of the Bangladeshi adult orthodontic patients. The results of the present study showed no statistically significant difference between the genders on all measured values. Bangladeshi male showed higher values than those of the Bangladeshi females in most of the variables. Mean values of cephalometric norms of Bangladeshi adults were very much different than the Class-I malocclusion adults.

## Conclusion

Extensive variations were witnessed for almost all measurements of Class II malocclusion and found that Bangladeshi adult males showed larger values than those of the Bangladeshi adult females and no statistically significant difference between the genders on all measured values.

During treatment of Class II malocclusion the reading should be kept in consideration for this group separately as it varies from the class I Malocclusion.

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