

# Cephalometric characteristics of Class II division 1 Malocclusion in a Population Living in the Chitwan District of Nepal

Deepika Kapoor<sup>1</sup>, Deepanshu Garg<sup>2</sup>

## ABSTRACT

**Introduction:** Class II Division 1 malocclusion is where the maxillary teeth are proclined and the molars are in disto-occlusion. In this study I have described and compared the dento-skeletal characteristics cephalometrically associated with Angle's Class II Division 1 malocclusion in a population living in Chitwan district of Nepal

**Materials and methods:** 20 lateral cephalograms of children (10 males and 10 females) in the age range of 7-13 years from local schools of Chitwan with Class II, division 1 malocclusion were analyzed. Age range of the representing children was 7 – 13 years.

**Results:** The maxilla was prognathic in relation to anterior cranial base in Class II Division 1 patients. Maxillary and mandibular incisors were proclined. Between the two groups, the cranial base angle was same. There was a significant reduction in interincisal angle.

**Conclusion:** In the Chitwan region of Nepal, Class II division 1 malocclusion has specific characteristics. Steiner's norms are not same for all the populations, that is why the subjects are treated taking into account their ethnicity and in relation to their macro-esthetic fundamentals. Cephalometric Steiner's norms for skeletal Class II were analyzed that showed the presence of prognathic maxilla, maxillary and mandibular dental proclination and a reduced interincisal angle.

**Keywords:** Lateral Cephalogram, Class II Division 1 Malocclusion, Steiner Analysis, Maxillary Proclination

## INTRODUCTION

Orthodontic treatment of a skeletal Class II Division 1 malocclusion patient relies on a thorough understanding of the components that are related to malocclusion.

Angle defined Class II malocclusion as "A distal relation of the lower to the upper permanent first molar to the extent of more than one-half the width of one cusp and the maxillary incisors being protrusive.<sup>1</sup> Class II malocclusion is a common malocclusion with a prevalence ranging between 5% and 29. The morphology of the dental and skeletal structures of patients exhibiting Class II malocclusion have been studied in several studies.<sup>2,3</sup>

Steiner CC (1953) has given a method to interpreting both the hard and soft tissues using cephalometric radiographs. He has divided this interpretation into various parts, namely the skeletal, dental and soft tissue.<sup>4</sup> The skeletal analysis explains the nominal to examine the maxillary and mandibular relation to the skull and to each other and the dental analysis has features to relate the maxillary and mandibular incisor teeth respective jaws and to each other. The soft tissue analysis provides the balance and harmony of the facial profile.<sup>5</sup>

Certain studies have indicated that in Class II division 1 patients, the maxilla was more protrusive whereas the mandible was normal in size and position. Whereas other studies found

that the maxilla was in a normal position in relation to the cranial base while the mandible was retrusive.<sup>3</sup> Some found that Class II skeletal pattern is due to both maxillary protrusion and mandibular retrusion. The ethnic backgrounds of the subjects which have been evaluated in this study have a role in measuring the craniofacial characteristics of the Class II pattern.<sup>6</sup>

The objective of this study was to assess the dentofacial characteristics of a sample of Chitwan district of Nepal, having Class II division 1 malocclusion and to compare the data obtained with that of norms of Caucasians.

## MATERIAL AND METHODS

A total of 20 lateral cephalograms of children (10 males and 10 females) in the age group of 7 to 13 years having Class II Division 1 malocclusion in the mixed dentition were taken.

All the cephalograms used in the study were obtained by a single operator and in a single machine. The cephalograms were taken with a digital "ORTHORALIX" cephalostat,

The distance between X- ray sources to subjects was kept at a constant distance of 152 cm and the film kept at a constant distance of 16 cm from the midsagittal plane of the subject. The radiographs were obtained with the subject in natural head position, seated condyles and lips in relaxed position.

Selection Criterion for Class II division 1 sample included<sup>8</sup>

- 1) Bilateral class II molar relationship in centric occlusion
- 2) Protrusion of maxillary incisors
- 3) No significant medical history
- 4) No history of trauma
- 5) Any history of dental speciality treatment like orthodontic, prosthodontic or oral maxillofacial
- 6) Absence of congenitally missing teeth
- 7) Absence of traumatic loss of maxillary incisors
- 8) Absence of class II occlusal interferences, such as palatally positioned anterior teeth
- 9) No posterior crossbite.

### Tracing technique

All the cephalograms were traced by a single operator on matted acetate tracing paper of 0.003" thickness and with 3 H microlead pencil. Cephalometric landmarks were located, identified and marked.

Reference points used for this study<sup>8</sup>

- Sella – the point representing the midpoint of the pituitary

<sup>1</sup>Lecturer, Pediatric and Preventive Dentistry, <sup>2</sup>Lecturer, Oral Medicine and Radiology, College of Medical Sciences, Nepal

**Corresponding author:** Deepika Kapoor, P-18, Tej Bagh Colony, Patiala, India

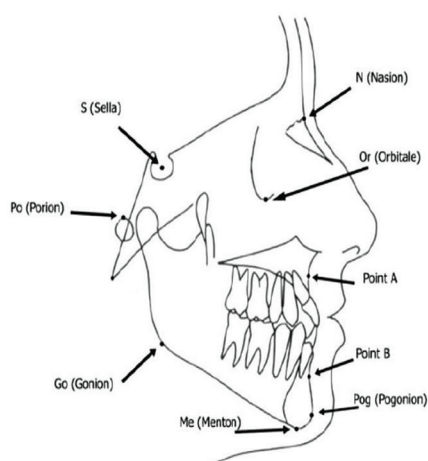
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Measurement	Mean	Standard Deviation
SNA	85.31	3.16
SNB	76.25	2.90
ANB	6.00	2.31
MP to SN	36.41	3.51
OP to SN	19.92	3.11
U1-NA(mm)	7.01	0.12
U1-NA	25.84	2.02
L1-NB	28.11	4.76
L1-NB (mm)	6.01	1.62
U1-L1	120.16	8.54

**Table-1:** Results of the present study.

Measurement	Steiners/Caucasians ideal values
SNA	82
SNB	80
ANB	2
MP-SN	32
OP-SN	14
U1-NA	22
UI-NA (mm)	4
LI-NB	25
LI-NB (mm)	4
Interincisal angle	131

**Table-2:** Norms For Caucasians By Steiner



**Figure-1:** Cephalometric reference points. Different reference points used in the present study and their abbreviations

fossa or sella turcica. It is a constructed point.

- Nasion – most anterior point in the mid way between the frontal and nasal bones on the frontonasal suture.
- Point A – deepest point in the midline between anterior nasal spine and the crest of the maxillary alveolar process.
- Point B – deepest point in the midline between the alveolar crest of the mandible and the mental process.
- Gonion – constructed point at the junction of ramal plane and the mandibular plane.
- Gnathion – most antero – inferior point on the symphysis of the chin.

Different cephalometric measurements used in the study.<sup>8</sup>

- SNA Maxillary apical base relationship to anterior cranial base
- SNB Mandibular apical base relationship to anterior cranial base

- ANB Apical base relationship
- MP-SN Inclination of mandibular plane angle to anterior cranial base
- OP-SN Inclination of occlusal plane to anterior cranial base
- U1-NA Inclination of maxillary incisors to NA
- U1-NA (mm) Protrusion of maxillary incisors to NA
- L1-NB Inclination of mandibular incisors to NB
- L1-NB (mm) Position of maxillary incisors relative to NB
- U1-L1 Inclination of maxillary incisors to mandibular incisors

## STATISTICAL ANALYSIS

Microsoft office 2007 was used for the statistical analysis. Descriptive statistics like mean and percentages were used for the analysis.

## RESULTS

In the Table 1 mean and standard deviation values for the angular and linear measurements for the Class II Division 1 children have been shown. Table 2 presents the norms for Caucasians. Class II Division 1 have significantly increased ANB ( $p < 0.001$ ). Maxilla was significantly more prognathic and mandible even more retruded in Class II as indicated by the increased SNA angle and decreased SNB angle ( $p < 0.001$ ). In the dental findings it was seen that upper incisors were significantly more proclined.

## DISCUSSION

A randomly selected group was further differentiated to choose the Class II Division 1 group sample in this study including the children from Chitwan District of Nepal. The control values were taken from the already established values given by Steiner for the Caucasians. As is already known that Class II division 1 can have a dental as well as a skeletal cause but the sample used was those with a skeletal Class II division 1 due to a prognathic maxilla and retruded mandible.<sup>9,10</sup> This is in agreement with several studies who found the maxilla to be normally positioned in Class II division 1 malocclusion.<sup>11</sup>

The mean angle of SNB was less in the study group this is in accordance to several studies<sup>12</sup> that indicated mandibular retrusion as a common characteristic of Class II malocclusion. The lower incisor inclination was calculated and found to be similar in both groups as also in a study done by Henery (1957) and in contrast to Al-Khateeb and Al-Khateeb (2009) whose study showed proclination of lower incisors in Class II division 1.<sup>9</sup> In the present study, cranial base angle was similar in both groups and this is in agreement with several reports<sup>5</sup> and disagrees with several other reports that indicated a correlation between cranial base angulation and malocclusion.<sup>4,6</sup> Future studies are required to evaluate the skeletal and dental features of children living in the other regions of Nepal and to compare the results with the present data. In addition, three dimensional skeletal and dental evaluations of the different types of malocclusion in these children are also required. Finally the characteristics of Class II division 2 malocclusion are also needed to be evaluated in the Chitwan population.

## CONCLUSION

Class II division 1 malocclusion in children living in Chitwan

district of Nepal is characterized by the following: significantly increased ANB angle, decreased SNB, more prognathic maxilla, normal mandibular position and proclined upper incisors and reduced interincisal angle. In the Chitwan region of Nepal, Class II division 1 malocclusion has specific characteristics. Steiner's norms are different for various ethnic groups and populations so the patients when treated should be treated only after giving ample consideration to the norms of their ethnicity.

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