Original article

UPDCJ OPEN ACCESS

Skeletal Pattern of Bangladeshi Patients with Class II Malocclusion Attending in a Selected Private Setting

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Article info.
Received: 03 April 2023
Accepted: 02 September 2023

Volume: Vol-13, Issue-2, October 2023

DOI: https://doi.org/10.3329/updcj.v13i2.65439

Publisher: Update Dental College, Dhaka, Bangladesh
Web: www.updatedentalcollege.edu.bd
E-mail: updcj@hotmail.com

Scan QR code to access your article on UpDCJ BanglaJOL index.

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ABSTRACT:

Background: The term "Class II malocclusion" encompasses a range of dental and skeletal characteristics, making precise diagnosis and treatment planning challenging. This study aimed to examine 32 Bangladeshi patients with Class II malocclusion to evaluate maxillary and mandibular skeletal positions using cephalometric measurements commonly used in clinical practice.

Methods: Study casts and lateral cephalograms of 32 patients (17 females and 15 males) with Class II malocclusion were analyzed. Inclusion criteria comprised Class II molar relationship, the absence of craniofacial deformities, and no previous orthodontic treatment. Cephalometric measurements included SNA, SNB, and ANB angles, and data were analyzed using SPSS software. **Results:** Among the patients, 53% exhibited maxillary skeletal protrusion, 43% had mandibular retrusion, and only 3.1% presented both maxillary protrusion and mandibular retrusion. Surprisingly, 31.2% showed maxillary skeletal retrusion, and 28.1% exhibited mandibular protrusion, highlighting the significant variation in skeletal patterns within this cohort.

Conclusion: Our findings emphasize the diverse skeletal patterns present among Bangladeshi patients with Class II malocclusion. The implications of these variations for treatment planning are substantial, as the treatment approach may differ depending on the underlying skeletal pattern. Given this diversity, individualized assessment and tailored treatment strategies are essential to achieve optimal outcomes. While this study has provided valuable insights, future research with larger and more diverse samples is warranted to further explore these complex relationships.

KEY WORDS: Class II malocclusion, Cephalograms, Maxillary prognathism, Mandibular retrognathism.

INTRODUCTION

Class II malocclusion is a frequently seen disharmony to the orthodontist in their clinical practice that has been a matter of intention and keen to many researchers. Both patients and their parents are concern because of the excessive overjet. The etiology of class II malocclusion is an interesting subject and there is still much to be explained and agreed. Therefore the analysis of maxillary and mandibular skeletal positions is essential in orthodontic treatment planning as well as for the planning of orthognathic surgery. The findings from the literature review are still inconclusive regarding the dentofacial characteristics of Class II malocclusion.[1] Many researchers came to a conclusion that diverse combinations of skeletal and dental fundamentals are responsible to class II malocclusion.[2-5] A number of cephalometric surveys were explored in different countries like in India[6], China[7] , Japan[8], Malaysia[9], Koria[10], Europe[11], Bangladesh[12-16] by several investigators, which focused the distinction in dentofacial arrangement of various racial and ethnic group as well as the morphological features.Therefore present study was conducted with the aim to examine Bangladeshi patients with Class II malocclusion and to evaluate the maxillary and mandibular skeletal positions by means of cephalometric measurements used in daily clinical practice by orthodontists.

MATERIALS AND METHODS

A total of 32 study casts and lateral cephalogramsof Bangladeshi patients were studied who visited for orthodontic treatment in a selected private dental clinic of Dhaka city for the duration of one year.The aim of this cross sectional study was to evaluate the maxillary and mandibular skeletal positions in patients by means of cephalometric measurements following the Steiner's analysis method. Steiner's analysis method s used in this study, as because its

methods of assessing skeletal and dental morphology are very useful and valid providing maximal clinical information with the least number of measurements.[17,18]The patients were selected irrespective of sex with no previous history of taking orthodontic treatment and absence of any craniofacial deformity or syndrome. Other inclusion criteria for this study set as permanent dentition state, presence of teeth from second molar to second molar, crowded and non-crowded incisors, class II molar relationship. Among all the patients who visited for orthodontic treatment in the selected private setting for one year duration, 32 patients were fulfilled the inclusion and exclusion criteria set for the study. So all the 32 patients were included in this study.Prior taking written informed consent from the patients or from their guardians explaining the purpose and procedure of the study cephalograms and data were collected.

The cephalometric measurements used in this study were – S point (Sella), N point (Nasion), A point (the deepest point of the anterior curvature of maxilla), B point (the deepest point of the anterior curvature of mandible), SN plane (line joining Sella and Nasion), NA plane (line joining Nasion and A point), NB plane (line joining Nasion and B point). Also the cephalometric landmarks/angles or variables were SNA, SNB and ANB. The linear and angular measurements of these cephalometric landmarks or variables are shown in Figure 1. The angular measurements used in this study were as follows according to the study conducted in Bangladeshi population by Rizvi and Hossain[19]

SNA : Angle between Sella-Nasion and Nasion-A point.
$80^0 – 82^0$:Orthognathic maxilla / Normal
$<80^0$:Retrognathic maxilla
$>82^0$:Prognathic maxilla
SNB : Angle between Sella-Nasion and Nasion-B point.
$78^0 – 80^0$:Orthognathic mandible / Normal
$<78^0$:Retrognathic mandible
$>80^0$:Prognathic mandible

ANB : SNA minus SNB
$2^0 –4^0$: Normal / Skeletal Class I
$>4^0$:Skeletal Class II
$<2^0$:Skeletal Class III

Prior to data collection, written informed consent was obtained from all patients or their legal guardians after a detailed explanation of the study's purpose and procedures.All the radiographs and tracings were done by a single investigator in a standard manner. Collected data were entered and analyzed using IBM SPSS Statistics (Version 21). Descriptive statistics, including frequency, percentage, mean, standard deviation, minimum, and maximum values, were calculated to summarize the data. The results were presented in figures and tables..

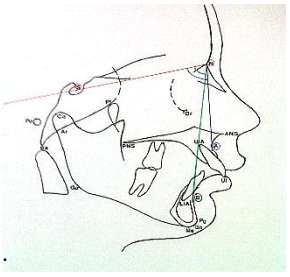

Figure 1 :Cephalometric landmarks and angles (SNA, SNB, ANB)
Red line : SN plane (Sella Nasion plane)
Blue line : NA plane (Nasion to point A plane)
Green line: NB plane (Nasion to point B plane)

Table 1 shows the descriptive statistics of cephalometric landmarks/angles, here the mean value of SNA angle, SNB angle and ANB angle were 82.75 ± 6.096, 78.53 ± 5.424 and 4.22 ± 2.612 respectively.

Table 1 : Descriptive statistics of SNA, SNB and ANB angles

Cephalometric landmarks/angles or variables	Mean (± SD)	Range
SNA angle	82.75 ± 6.096	92 - 95
SNB angle	78.53 ± 5.424	70 - 93
ANB angle	4.22 ± 2.612	0-10

SNA=Sella-Nasion-point A angle, SNB= Sella-Nasion-Point B angle, ANB=Point A-Nasion-Point B angle, SD= Standard deviation

Table 2 shows out of 32 patients, almost half of the patients (53.1%) skeletal pattern of maxilla was prognathic, 31.2% was retrognathic and 15.6% was orthognathic according to SNA angle.
According to SNB angle, less than half of the patients (43.8%) skeletal pattern of mandible was retrognathic, whereas prognathic and orthognathic mandibular skeletal pattern was 28.1% each.

Table 2 : Skeletal pattern of maxilla and mandible in Angle's Class II Malocclusion patients (n=32)

Skeletal pattern of maxilla			Skeletal pattern of mandible		
	Criteria	**n (%)**		**Criteria**	**n (%)**
SNA angle	Normal (80 – 82)	5 (15.6)	**SNB angle**	Normal (78 – 80)	9 (28.1)
	Prognathic maxilla (> 82)	17 (53.1)		Prognathic mandible (> 80)	9 (28.1)
	Retrognathic maxilla (< 80)	10 (31.2)		Retrognathic mandible (< 78)	14 (43.8)
	Total	**32 (100.0)**		**Total**	**32 (100.0)**

Table 3 shows half of the patients skeletal pattern was Class I having 2^0-4^0 ANB angle, whereas 40.6% were Class II skeletal pattern having $> 4^0$ ANB angle. Only 9.4% were Class III skeletal pattern having $< 2^0$ ANB angle.

Table 3 : Relationship of skeletal maxilla to mandible

Cephalometric landmark	Criteria	n (%)
ANB angle	2^0 - 4^0 : Normal or skeletal Class I	16 (50.0)
	$> 4^0$: Class II skeletal pattern	13 (40.6)
	$< 2^0$: Class III skeletal pattern	3 (9.4)
Total		**32 (100.0)**

Table 4 out of 32 patients, more than half (53.1%) were maxillary prognathism, 31.2% were maxillary retrognathism. Whereas 43.8% were mandibular retrognathism and 28.1% were mandibular prognathism, only 3.1% cases were both maxillary prognathism and mandibular retrognathism.

Table 4 :Skeletal pattern of maxilla and mandible in class II malocclusion patients

Pattern of maxilla	Pattern of mandible			Total
	Prognathic	Normal / Orthognathic	Retrognathic	
	n (%)	n (%)	n (%)	
Prognathic	9 (28.1)	7 (21.9)	**1 (3.1)**	**17 (53.1)**
Normal / Orthognathic	0 (0)	1 (3.1)	4 (12.5)	5 (15.6)
Retrognathic	0 (0)	1 (3.1)	9 (28.1)	**10 (31.2)**
Total	**9 (28.1)**	9 (28.1)	**14 (43.8)**	32 (100.0)

DISCUSSION

Class II malocclusion incorporates many variation of skeletal, dental, functional components which has a significant role in orthodontic treatment planning.[20] This investigation studied the maxillary and mandibular skeletal positions in Bangladeshi Class II malocclusion patients using lateral cephalograms and dental casts. According to the study result out of 32 (100.0%) class II malocclusion patients, the mean value of SNA angle found 82.75 ± 6.096 with the skeletal pattern maxillary prognathism 53.1% followed by retrognathism 31.2% and orthognathism 15.6%. On the other hand the mean value SNB angle found 78.53 ± 5.424 in class II malocclusion patients with the skeletal pattern of retrognathism in 14 (43.8%) cases followed by prognathism and orthognathism in 9 (28.1%) cases. Out of 32 cases the cephalometric measurements of ANB angle comprises skeletal class I in half of the cases having 2^0-4^0 ANB angle. Skeletal class II pattern found in less than half (40.6%) cases having ANB angle > 4^0 and only 9.4% cases were skeletal class III pattern having ANB angle < 2^0. Present study found skeletal Class I malocclusion as the most common anterior posterior pattern of malocclusion followed by skeletal class II and skeletal class III. This finding was inconsistent with the study reported by Gulerum,[21]Ijaz,[22]Hameed[23] in Pakistan where skeletal class II showed as the most common anterior posterior pattern of malocclusion. In a study conducted by Rosenblum[24] assumed to assess maxillary prognathism or mandibular retrognatism is the cause for skeletal class II malocclusion, where mandibular retrusion found in almost 27% cases and maxillary protrusion found in 56.3%. Present study found almost similar findings regarding maxillary skeletal protrusion which was 53% in class II malocclusion. Moreover present study also showed 43% cases mandible was retruded and only 3.1% showed both maxillary protrusion and mandibular retrusion. Surprisingly maxillary skeletal retrusion is responsible for skeletal class II malocclusion in 31.2% cases and in 28.1% cases mandibular protrusion was responsible for skeletal class II malocclusion.A number of study[25-27]demonstrate that in the majority of class II div I cases the malocclusion is determined by mandibular retrognathism. But present study found majority class II malocclusion cases maxillary prognathism was the reason for skeletal class II malocclusion.

CONCLUSION:

Present study concluded that the skeletal pattern of Bangladeshi patients with Class II malocclusion showed a great variation. As the treatment options for Class II malocclusion with maxillary protrusion and Class II malocclusion with mandibular retrusion are different, every case should be properly evaluated before initiation of treatment and treatment should be targeted towards the contributing component of the malocclusion.

LIMITATIONS:

This study has some limitations. First, it was conducted with a relatively small sample size of 32 patients who attended a specific private dental clinic in Dhaka city. While this sample was carefully selected and met the inclusion criteria, the findings may not be representative of the entire Bangladeshi population. Second, the study included a limited number of variables, focusing primarily on cephalometric measurements based on the Steiner's analysis method. While this method is valuable for assessing skeletal and dental morphology, it does not encompass all possible variables that could influence Class II malocclusion. Third, due to the small sample size and the primarily descriptive nature of the study, inferential statistics were not applied. As a result, the findings provide valuable insights into the sample but may not be suitable for making broader conclusions or generalizations about the entire population. To establish a more robust evidence base, future research should aim to expand the study population to encompass both public and private healthcare settings, consider different age groups, and account for diverse ethnic backgrounds. These efforts will contribute to a more comprehensive understanding of Class II malocclusion among Bangladeshi patients.

CONFLICT OF INTEREST: The authors declare no conflict of interest.

FUNDING: This research received no external funding.

DATA AVAILABILITY STATEMENT: The data presented in this study are available on reasonable requestfrom the corresponding author.

ACKNOWLEDGEMENT: The authors would like to express their sincere gratitude to Dr. Md Nazmul Hasan, Head of Customer Support at Orthosnap Corp., Westbury, NY, USA, Ex. Head of the department of Dentofacial Orthopedics, Update Dental College, Dhaka, Bangladesh for his invaluable contribution in critically revising this manuscript for intellectual content. His expertise, insightful feedback, and attention to detail greatly enhanced the quality and clarity of the work." We kindly request your permission to include this modified acknowledgement in the main manuscript. Your feedback and agreement are important to us. Thank you once again for your valuable contribution, and we look forward to hearing from you.

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CITE THIS ARTICLE:

Khan SH, Ahmed N, Tahsin T, Sultana N, Rubby MG. Skeletal Pattern of Bangladeshi Patients with Class II Malocclusion Attending in a Selected Private Setting. Update Dent. Coll. j [Internet]. [cited 2023 Oct. 7];13(2):34-37. Available from: https://www.banglajol.info/index.php/UpDCJ/article/view/65439