Research Article

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Comparative Analysis of Sagittal Jaw Dysplasia by Various Cephalometric Angular Parameters Between Male and Female Subjects Presenting with Skeletal Class I and Class II Malocclusion in Bhopal Population

Jaina Dubey[1*] Amitabh Kallury[2] Rajesh Kumar Balani[3] Chandni Bharti[4] Shradha Choudhary[5] Swati Tripathi[6]

[1]PG Student, Department of Orthodontics & Dentofacial Orthopedics, Peoples Dental Academy, Peoples University, Bhopal, MP, India.
[2]Professor and Head, Department of Orthodontics & Dentofacial Orthopedics, Peoples Dental Academy, Peoples University, Bhopal, MP, India.
[3]Reader, Department of Orthodontics & Dentofacial Orthopedics, Peoples Dental Academy, Peoples University, Bhopal, MP, India.
[4]Reader, Department of Orthodontics & Dentofacial Orthopedics, Peoples Dental Academy, Peoples University, Bhopal, MP, India.
[5]PG Student, Department of Orthodontics & Dentofacial Orthopedics, Peoples Dental Academy, Peoples University, Bhopal, MP, India.
[6]PG Student, Department of Orthodontics & Dentofacial Orthopedics, Peoples Dental Academy, Peoples University, Bhopal, MP, India.

ABSTRACT

Background: Purpose of this study is to compare the various cephalometric angular parameters between male and female subjects of skeletal class I and class II groups in Bhopal population.

Material and Method: Eighty cephalograms of patients between the age of 16-25 years were selected and divided into 2 groups (n= 40) i.e. Skeletal Class I and II on the basis of ANB Angle and Wits Appraisal. These were further subdivided into Male and Female (n=20).Landmarks were located,traced and analyzed.

Results: There was statistically highly significant difference found for Yen angle & W angle in male & female of skeletal class I group (p=0.001) while for the Beta angle, SAR angle and HBN angle, no statistically significant differences were found. (p>0.05) There was a statistically significant difference found only for Beta angle in male & female of skeletal class II patients (p<0.05) while for all other angles, there was no statistically significant difference was found.

Conclusion: In skeletal class I group, Yen and W angle show statistically significant values between male and female of while in skeletal class II group, Beta angle shows statistically significant values..

Keywords: Sagittal dysplasia, Beta Angle, Yen Angle, W Angle, SAR Angle.

INTRODUCTION

In orthodontic diagnosis and treatment planning, evaluation of anteroposterior discrepancy is of importance to the orthodontist. Both angular and linear parameters have been incorporated into numerous cephalometric analyses which help to diagnose anteroposterior discrepancies and establish the most appropriate treatment plan.[1] Since the advent of cephalometrics by Broadbent,[2] various cephalometric measurements have been devised, among which ANB[3,4] and Wits Appraisal[5] probably have gained the most extensive acceptance. However, they too have apparent shortcomings.[4,5,6,7] In order to overcome these shortcomings, several new parameters have been introduced (i.e. Beta[1], Yen[8], W[9], SAR[10] & HBN[11] angles) for assessing sagittal jaw discrepancy.

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***Correspondence Dr. Jaina Dubey.**
Department of Orthodontics & Dentofacial Orthopedics, Peoples Dental Academy, Peoples University, Bhopal, MP, India.
Email: dubeyjaina@gmail.com

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Previous studies have shown that there is no difference in the mean values of these cephalometric parameters, i.e. Beta, Yen, W, SAR & HBN angles between males and females of different skeletal pattern.[1,8,9,10,11]

Purpose of this study is to compare the various cephalometric angular parameters between male and female subjects presenting with skeletal class I and class II malocclusion in Bhopal population.

Aim: To compare the different cephalometric angular parameters between male and female subjects presenting with skeletal class I and class II malocclusion in Bhopal population.

MATERIAL AND METHOD

A retrospective study was done in which a total of 80 pretreatment lateral cephalograms of 16-25 years old individuals were collected and traced. ANB angle and Wits appraisal was measured to assign the lateral cephalograms to Skeletal Class I & II groups.

(A) INCLUSION CRITERIA

1. Age between 16- 25 years

2. For the Class I skeletal pattern group

ANB angle = 2-4 degree

Wits appraisal: Male: -1mm ±1.9, Female; 0mm ±1.77

3. For the Class II skeletal pattern group

ANB angle = greater than 4 degree

Wits appraisal more than normal

4. All permanent teeth up to the 2nd molar present

(B) EXCLUSION CRITERIA

1. Unacceptable quality radiographs
2. History of orthodontic intervention/ TMJ trauma cases
3. Facial asymmetry
4. Missing Teeth

All lateral cephalograms were taken on a Planmeca Proline XC Trophy Radiographic Lateral Cephalogram X-ray machine, Italy equipped with mirror eye. All lateral cephalograms were taken in NHP. [12,13] Radiographs were exposed at 85KV/ 10mA for 1.75 second. Each film was traced by a single operator and the data was suitably compiled and analyzed by using an appropriate statistical method. 20 lateral cephalograms were randomly selected and traced by the same operator in order to evaluate accuracy in tracing as well as inter/intra-examiner errors. Student's t-test was used to analyze the variation in a mean between Skeletal Class I & Class II group with a normal distribution. To determine the Beta, Yen, W, SAR and HBN angles following anatomic landmarks were used.

Point A: Deepest point on the midline of the maxilla, which moves from base to alveolar process.[14]

Point B: Most anterior part of the base of mandible and the most posterior point of the outer contour of the mandibular alveolar process in midline.[14]

Point M: Determined by the centre of the largest best-fit circle tangent to the anterior, superior and palatal surface of the premaxilla in each radiograph.[10]

Point G: Determined by the centre of the largest best-fit circle tangent to the internal, anterior, inferior and posterior surfaces of mandibular symphysis.[10]

Point W (Walkers Point): The mean intersection point of the lower contours of the anterior clinoid processes and the contour of the anterior wall of sella turcica.[10]

Point C: Center of the condyle, found by tracing the head of the condyle, and approximating its center.[11]

Mandibular plane: is the tangential line on the lower border of the mandible.[14]

Beta angle is the angle between the perpendicular line from point A to C-B line and the A-B line.

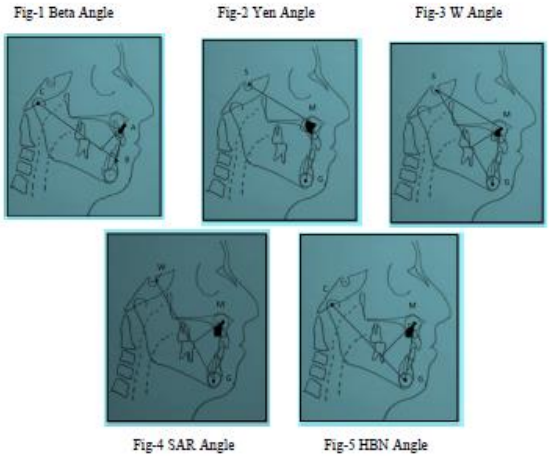
(Fig-1)

Yen Angle is the angle formed by S- M line and M- G line. (Fig-2)

W Angle is the angle between perpendicular line from point M to SG line and the M – G line. (Fig-3)

SAR Angle is the angle between the perpendicular line from point M to W-G line and the M-G line. (Fig-4)

HBN Angle is the angle between the perpendicular line from point M to C-G line and the M- G line. (Fig-5)



RESULTS

In our study, the mean value of ANB angle was 1.817±1.28 & 2.017±1.47, mean Wits was 0.100 ±2.83 & -1.583±3.02 mm, mean Beta angle was 31.550±4.55 & 31.833±4.33, mean Yen angle was 124.833±2.99 & 121.733±3.25, mean W angle was 57.000±1.97 & 54.583±2.63, mean SAR angle was 59.5±1.10 & 58.9±1.51 and mean HBN angle was 42.05±2.74 & 40.7±2.17 for male & female of skeletal class I patients respectively. There was statistically highly significant difference found for Yen angle & W angle in male & female skeletal class I patients (p=0.001) while for the Beta angle, SAR angle and HBN angle there was no statistically significant difference found. (p>0.05) (Table 1/Graph 1)

In this study mean value of ANB angle was 6.333±1.37 & 6.250±1.18, mean Wits was 4.533±2.57 & 2.350±2.82 mm, mean Beta angle was 22.600±5.50 & 25.650±5.36, mean Yen angle was 117.733±4.90 & 116.600±4.01, mean W angle was 52.633±3.28 & 51.400±3.34, SAR angle was 54.0±1.55 &54.25±1.61 and HBN angle was 35.0±2.15 & 34.7±0.91 among male & female of skeletal class II patients respectively. There was a statistically significant difference found in Wits & Beta angle in male & female of skeletal class II patients (p<0.05) while for all other angles, there was no statistically significant difference found. (p>0.05) (Table 2/ Graph 2)

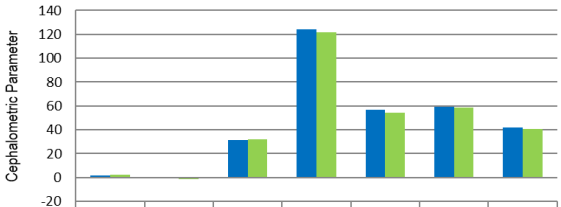
Table 1: Comparative evaluation of various cephalometric parameters between male & female subjects among Skeletal Class I patients.

Groups	ANB-Angle		WITS (mm)		Beta-Angle		YEN Angle		W Angle		SAR Angle		HBN Angle	
Class I	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
MALE (N=20)	1.81	1.28	0.10	2.83	31.55	4.55	124.83	2.99	57.0	1.97	59.5	1.10	42.05	2.74
FEMALE (N=20)	2.01	1.47	-1.58	3.02	31.83	4.33	121.73	3.25	54.5	2.63	58.9	1.52	40.7	2.17

Table 2: Comparative evaluation of various cephalometric parameters between male & female subjects among Skeletal Class II patients.

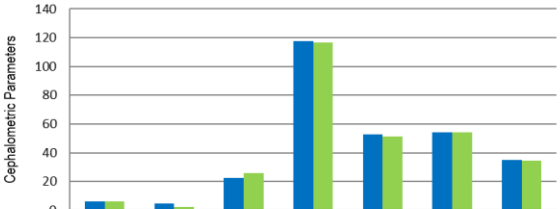
Groups	ANB-Angle		WITS (mm)		Beta-Angle		YEN Angle		W Angle		SAR Angle		HBN Angle	
Class II	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
MALE (N=20)	6.33	1.37	4.53	2.57	22.6	5.50	117.7	4.90	52.63	3.28	54.0	1.55	35.0	2.15
FEMALE (N=20)	6.25	1.18	2.35	2.82	25.65	5.36	116.6	4.01	51.40	3.34	54.25	1.61	34.75	0.91

Graph-1 Comparative evaluation of various cephalometric parameters between male & female subjects among Skeletal Class I patients.



	ANB	Wits	BETA	YEN	W Angle	SAR	HBN
Male	1.81	0.1	31.5	124.5	57	59.5	42
Female	2.01	-1.58	31.8	121.7	54.5	58.9	40.7

Graph-2 Comparative evaluation of various cephalometric parameters between male & female subjects among Skeletal Class II patients.



	ANB	Wits	BETA	YEN	W Angle	SAR	HBN
Male	6.33	4.53	22.6	117.7	52.6	54	35
Female	6.25	2.35	25.6	116.6	51.4	54.2	34.7

DISCUSSION

Accurate diagnosis of the sagittal jaw relationship is essential in orthodontic treatment planning. Both angular and linear cephalometric variables have been proposed to assess sagittal jaw relationship and jaw position. Angular measurements can be erroneous as a result of changes in facial height, jaw inclination, and total jaw prognathism; while the linear variables can be affected by the inclination of the reference lines.[15] All variables have their own limitations. Several cephalometric variables have been introduced and norms established for assessing sagittal jaw discrepancies in different populations, specific to their ethnic and racial groups along with verifying the existence of sexual dimorphism. In literature, it has been shown that all the measured parameters in the current study have no gender dimorphism among different skeletal patterns.[1,8,9,10,11] Keeping this in mind , the present study was designed to compare the various cephalometric angular parameters between male and female subjects presenting with skeletal class I and class II malocclusion in Bhopal population.

In the present study, the mean value of ANB angle was 1.817±1.28 & 2.017±1.47, mean Wits was 0.100 ±2.83 & -1.583±3.02 mm, mean Beta angle was 31.550±4.55 & 31.833±4.33, mean Yen angle was 124.833±2.99 & 121.733±3.25, mean W angle was 57.000±1.97 & 54.583±2.63, mean SAR angle was 59.5±1.10 &58.9±1.51and mean HBN angle was 42.05±2.74 & 40.7±2.17 among male & female of skeletal class I patients respectively. There was statistically highly significant difference found for Yen angle & W angle in male & female of skeletal class I patients (p=0.001) which were in contrast with the study done by **Neela et al[8]**, **Jain et al[16]**, **Bhad et al[9]**, **Al-Mashhadany SM[17]** respectively. There was no statistically significant difference found for Beta angle (p>0.05) which was in accordance with the study done by **Baik et al[1]**, **Jain et al[16]**, **Prasad et al[18]**, **Bhardwaj et al[19]**, SAR angle which was in accordance with the study conducted by **Agarwal et al[10]** and HBN Angle value agreed with the result of **Dave et al[11]** study.

In the present study, the mean value of ANB angle was 6.333±1.37 & 6.250±1.18, mean Wits was 4.533±2.57 & 2.350±2.82 mm, mean Beta angle was 22.600±5.50 & 25.650±5.36, mean Yen angle was 117.733±4.90 & 116.600±4.01, mean W angle was 52.633±3.28 & 51.400±3.34, SAR angle was 54.0±1.55 &54.25±1.61and HBN angle was 35.0±2.15 & 34.7±0.91 among male & female of skeletal class II patients respectively. There was a statistically significant difference found only for Beta angle in male & female of skeletal class II patients (p<0.05) which was in contrast with the study done by **Baik et al[1]**, **Jain et al[16]**, **Prasad et al[18]**, **Bhardwaj et al[19]**, while for all other angles there was no statistically significant difference found (p>0.05). This result was in accordance with the study done by **Neela et al[8]**, **Bhad et al[9]**, **Jain et al[16]**, **Prasad et al[18]**, **Bhardwaj et al[19]**, **Agarwal et al[10]** , **Dave et al[11]**.

CONCLUSION

This study concluded that

1- In skeletal Class I patients, Yen Angle & W Angle showed a statistically significant difference between male & female while the other angles, i.e. Beta Angle, SAR Angle and HBN Angle showed insignificant values.

2- In skeletal class II patients, Beta Angle showed a statistically significant difference in male & female of skeletal class II patients while other angles, i.e. Yen Angle, W Angle, SAR Angle and HBN Angle showed insignificant values.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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