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Original Research Paper

Orthodontology

THE RELIABILITY OF BETA ANGLE IN ASSESSING CLASS III SKELETAL BASE

Dr. Sreehari S*	Assistant Professor, Department of Orthodontics, Govt. Dental College Kozhikode. *Corresponding Author
Dr. M. Jayarama	Former Professor & Head, Department of Orthodontics, Govt. Dental College, Kozhikode.
Dr. Latheef VP	Associate Professor, Department of Orthodontics, Govt. Dental College, Thrissur.

ABSTRACT This study aims to assess the efficiency of Beta angle, a cephlometric angle used for measuring sagittal skeletal base relationship to differentiate class III skeletal base from class I skeletal base. 30 pre-treatment cephalograms were grouped in to Class I group and Class III group each based on angle ANB, from 123 lateral cephalograms. The Beta angle values obtained were analyzed. The angle Beta is 80% sensitive and 87% specific in differentiating a Class III from a Class I

KEYWORDS : Beta Angle, Skeletal Class III

INTRODUCTION

The ANB angle by Riedel, 1952 [1,2] and the Wits appraisal by Jacobson, 1975 [3] have been considered as the most commoncephalometric tools for assessing antero-posterior jaw discrepancies. The first and commonly used method in orthodontic literature is the ANB angle. The relative forward or backward positioning of Nasion by virtue of an excessively long or short anterior cranial base (line SN) or a relative posterior or anterior positioning of both jaws within the skeletal craniofacial complex will directly influence the ANB reading. The clockwise or counterclockwise rotation of the jaws relative to the cranial reference planes also affects the ANB angle reading[,5]. Accurate identification and reproduction, of the occlusal plane is not always easy. Any change in the angulation of the functional occlusal plane, caused by either normal development of the dentition or orthodontic intervention; can profoundly influence the Wits appraisal[4].A measurement independent of cranial reference planes or dental occlusion would be a desirable adjunct in determining the apical base relationship. Such a measurement was later developed and named, The Beta Angle by Baik C Y and Ververidou[6]. A line is extended form the center of Condyle 'C' to B point and another linefrom point A to point B. Then a perpendicular is drawn from CB line through point A. The angle formed at point A, between A-B line and the perpendicular constitutes the Beta angle.Malabar geographically occupies the northern part of Kerala state,with the majority speaking Malayalam language with Dravidianethnicity.

This study is being undertaken to estimate the reliability of Beta angle values in differentiating a Class III skeletal base from a Class I skeletal base

AIM AND OBJECTIVES

1. To assess the beta angle value of Class III group in Malabar population
2. To assess the reliability of Beta angle value in differentiating a Class IIIskeletal relationships from a Class I skeletal relationship in Malabar population.

MATERIALS AND METHODS

The present study was carried out in the Department of Orthodontics, Govt. Dental College, Calicut. The number of samples obtained was 30 in class III. All subjects selected were between the 11–25 years age group and had never undergone orthodontic treatment before taking the cephalogram and there was no history of permanent tooth extraction. Cases with functional shift of mandible were also excluded from the study.The lateral cephalograms were taken using Planmeca 2002 CC Proline TM machine and standardised procedure. The cephalograms were traced on acetate matte tracing paper of 0.003-inch thickness with a sharp 3H drawing pencil on a view box using trans-illuminated light. Angular and linear measurements were obtained nearest to 0.5mm and 0.5 degree by ruler, scale and protractor.

Cephalometric landmarks and measurements used in this study were

S - Sella turcica. The geometric center of the pituitary fossa (Sella turcica), determined by inspection. It is a constructed point in the midsagittal plane

N – Nasion. The intersection of the inter nasal and fronto-nasal sutures, in the midsagittal plane. It is the anterior most point of the fronto nasal suture in the median plane

A - Point A, Subspinale. The deepest midline point in the curved bony outline from the base of the alveolar process of the maxilla. i.e.the most posterior point between the anterior nasal spine and Prosthion. In anthropology it is known as Subspinale

B - Point B, Supramentale, sm. Most anterior point of the mandibular base. The deepest (most posterior) midline point on the bony curvature of the anterior mandible, between infradentale and Pogonion, in mid sagittal plane. In anthropology it is called asSupramentale

C – Centre of condyle. Located by tracing the head of the condyle and approximating its center. Utilizing these landmarks, various linear and angular measurements were valued

Angular Measurements

SNA The Postero-inferior angle between the lines SN and NA

SNB The Postero-inferior angle between the lines SN and NB

ANB, The difference between the angles SNA and SNB. Positive value when SNA is greater than SNB and vice versa

Beta angle - The angle between the perpendicular from C-B line to point A and the A-B line. An ANB value of <0 deg was the criterion for including the samples into Class III group. In each patient, the Beta angle were measured and tabulated

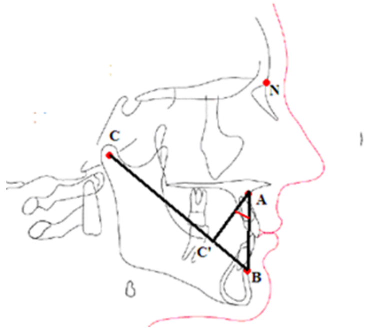


Fig. 1. THE BETA ANGLE

RESULTS

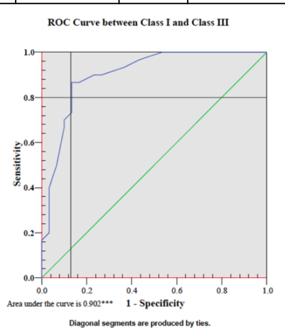
The mean value for Beta angle in the Class III was 41.7° with a standard deviation of 3.7

Table I

NO	AGE	SEX	ANB [deg]	Beta angle [deg]
1	24	M	-1	40.5
2	22	M	-2	35
3	16	F	-2	42
4	14	F	-3.5	41
5	17	M	-5	44.5
6	18	M	-5	41
7	15	M	-3	45.5
8	15	F	-0.5	39.5
9	14	F	-2	41
10	21	F	-1	38.5
11	18	M	-1	42.5
12	18	M	-2	45
13	16	M	-2	40
14	13	F	-1	36
15	13	M	-1	39.5
16	17	M	-1	38
17	16	M	-1	37
18	20	M	-1	42
19	13	F	-4	42
20	13	M	-5	47
21	20	F	-2	43
22	14	F	-5	48
23	15	M	-0.5	42.5
24	20	F	-4	42.5
25	13	F	-4.5	50
26	13	M	-4.5	47
27	13	F	-3	41
28	21	F	-1	34
29	13	F	-4	44
30	12	M	-3	41

TABLE II

ANB	N	Mean	Std Deviation	Std Error	95% confidence interval for Mean	
					Lower bund	Upper bound
<0	30	41.683	3.74277	.68333	40.2858	43.0809



DISCUSSION

ANB angle is the most commonly used parameter among measurements used to assess the antero-posterior skeletal jaw relationships[2]. The validity of these parameters has been investigated by many clinicians and researchers. Jacobson[3,7]observed that the ANB angle does not provide an adequate assessment of jaw relationship, as the rotational growth of the jaws and the antero-posterior position of Nasion influence the ANB angle. Hussels and Nanda[8] noted two additional factors affecting the ANB angle namely, the vertical lengths from Nasion to point B and the vertical length from point A to point B. So the use of a new parameter in conjunction with other parameters for describing sagittal jaw relationship seems preferable. This study is carried out primarily to evaluate Angle Beta as an alternative or additional diagnostic parameter to Angle ANB in assessing antero-posterior skeletal relationship and to assess its reliability in differentiating a class III skeletal base from a class I skeletal base. 30 cephalograms traced in both classes were included in the study.

The mean Beta value obtained class III was 41.7°. Thecorresponding value obtained in the Baik [6] study was 40 °. The mean Beta values obtained in the present study were slightly higher than that of original study conducted in white population. The difference in populations considered in the two studies might be the reason for getting different mean Beta angle values. The standard deviations from the mean Beta values for different groups were analyzed. So a beta angle value higher than 38°can be considered as class III.

Receivers operating characteristic curves [ROC] were used for examining the sensitivity and specificity of Beta angle in differentiating the skeletal pattern in to Class I and Class III groups. ROC curves are useful in evaluating the performance of classification schemes in which there is one variable with two categories by which subjects are classified. It gives the measurements in sensitivity and specificity. Sensitivity of a test is an indication of the capability of a test to accurately yield positive results when applied to patients known to have a disease. It measures the true positive [TP] value. Specificity of a test is an indication of the capability of a test to yield negative results accurately, when applied to subjects known to be free of disease. It measures the true negative [TN] value. The result showed that Beta value of 38° has 80% sensitivity and 87% specificity for considering it under the Class I skeletal group when compared to Class III group. It implies that above the Beta angle value 38°, chance for Beta measurement to come under Class I group is relatively less. That means, the Beta values above 38° can be considered as class III. The values achieved in this study almost coincide with the mean Beta value [33.80] ± 1 SD of the Class I ANB group.

SUMMARY AND CONCLUSION

The present study was undertaken to evaluate the reliability of Beta angle in assessing sagittal Class III skeletal base relationship cephalometrically. From the findings obtained in the present study,it can be concluded that

1. Beta angle value greater than 38°can be considered as a Class III skeletal base
2. Beta angle is a valuable parameter based on specificity and sensitivity in differentiating a class III skeletal base from a class I skeletal base.
3. Beta angle measurement can be recommended as additional or alternative parameter to Angle ANB.

REFERENCES

1. Richard A. Riedel. The relation of maxillary structures to cranium in malocclusion andin normal occlusion. Angle Orthod1952; 22:142-145.
2. Richard A. Riedel. An Analysis of Dentofacial Relationships. 1957; Am. J. Orthod. 43:103-119.
3. Jacobsen A. The Wits appraisal of jaw disharmony. Am J Orthod1975; 67: 125-138.
4. Bishara S E, Fahl J A, Peterson L C. Longitudinal changes in the ANB angle and Witsappraisal: clinical implications. Am J Orthod1983; 84:133-9.

5. Charles M. Taylor. Changes in the relationship of Nasion, point A and point B, and theeffect upon ANB. Am J Orthod1969; 56: 143-163
6. Chong YolBaik and Maria Ververidou. A new approach of assessing sagittaldiscrepancies: The Beta angle. Am J Orthod 2004; 126:100-5.
7. Jacobsen A. Update on the Wits appraisal. Angle Orthod1988; 58:205-19.
8. Wolfram Hussels and Ram S Nanda. Analysis of factors affecting angle ANB. Am JOrthod 1984; 85: 411-423.