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THE RELIABILITY OF BETA ANGLE IN ASSESSING CLASS II SKELETAL BASE IN MALABAR POPULATION

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ABSTRACT The study aims to assess the ability of Beta angle, a cephlometric angle used to measure anterio - posterior skeletal base relationship to identify class II skeletal base.63 pre-treatment cephalograms were selected in to Class II group based on angle ANB, from 123 lateral cephalograms. The Beta angle values obtained were analyzed. The angle Beta is sensitive and specific in differentiating a Class II from a Class I

KEYWORDS : Beta angle, skeletal class II

INTRODUCTION
Angle ANB, Riedel, 1952 [6,7] and the Wits appraisal, Jacobson, 1975 [4,5] have been considered as the most common cephalometric tools for assessing anteroposterior jaw discrepancies. The first and commonly used cephalometric method in orthodontic literature is the ANB angle. However, it has some shortcomings. The length of anterior cranial base which directly affect relative positioning of Nasion, (line SN) or a relative posterior or anterior positioning of both maxillary and mandible within the skeletal craniofacial complex will directly affect the ANB reading. The rotation of the jaws relative to the cranial reference planes also affect the ANB angle reading[1,2].The other parameter ,The Wits appraisal is based on the functional occlusal plane. Accurate identification and reproduction, of the occlusal plane is not always easy. A change in the angulation of the functional occlusal plane, by normal development of the dentition or orthodontic intervention; profoundly influence the Wits appraisal[1].So,there should be 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[3]. A line is extended form the center of Condyle 'C' to B point and another line from 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, India with Dravidian ethnicity.

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

AIM and OBJECTIVES
1. To assess the beta angle value of Class II group in Malabar population
2. To assess the reliability of Beta angle value in differentiating a Class II skeletal 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. 123 cephalograms were traced and of which 63 were grouped in to class II based on ANB value greater than 3 degree. On consultation with the statistician all 63 samples were included for the analysis. 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 CCProline™ 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 Subs pinale

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 midsagittal plane. In anthropology it is called as Supramentale

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 >3 deg was the criterion for including the samples in to Class II group. In each patientthe Beta angle were measured and tabulated

Fig. 1. The Beta Angle

RESULTS

The mean value for Beta angle in the Class II was 26.6^0 with a standard deviation of 5.9

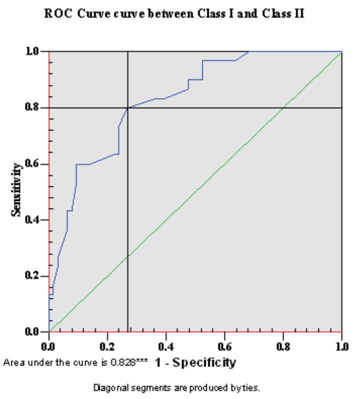
Table I Beta angle for class II subjects with ANB > 3

NO	AGE	SEX	ANB	Beta
1	13	F	5.5	25
2	21	M	6	29
3	13	M	6	16
4	13	M	6.5	28
5	12	M	3.5	29
6	13	M	5.5	26.5
7	12	M	8	20
8	15	F	4	34.5
9	13	F	5.5	24
10	15	F	4	28
11	23	F	3.5	32
12	15	F	5.5	30.5
13	13	F	9	20
14	11	F	5.5	25
15	13	M	4	30
16	13	M	5	29
17	19	M	5	36
18	12	M	7.5	15
19	18	F	7	30
20	13	M	8	22
21	12	F	6	29.5
22	21	F	4	30
23	21	F	4.5	32
24	13	M	11.5	14.5
25	19	M	5	34
26	19	F	6	30
27	13	F	6	22.5
28	17	F	3.5	32.5
29	15	M	6.5	32
30	20	F	6	29
31	12	F	5	17.5
32	14	F	6.5	26
33	12	F	5	32
34	21	F	3.5	31.5
35	12	M	6	23
36	12	M	6	16
37	20	F	3.5	30.5
38	16	F	6	25
39	21	M	6	23
40	12	M	6	24
41	13	M	6	25
42	13	M	6	24
43	17	M	8	18
44	13	M	7	23
45	25	M	7.5	22
46	13	F	10	23
47	13	F	5	20
48	21	F	5.5	37
49	12	M	8	16
50	12	M	5	19.5
51	24	F	8	36
52	17	F	5	29.5
53	13	F	9	28
54	15	F	6	30
55	20	M	7	21.5
56	11	F	6	32.5
57	20	F	5	19
58	14	F	6	25
59	21	F	9	32
60	21	M	3.5	32.5
61	14	M	7.5	29
62	10	F	4	30
63	18	F	3.5	38.5

Table II Mean and standard deviation of Beta values

	N	Mean	Std Deviation	Std Error	95% confidence interval for Mean	
					Lower bund	Upper bound
>3	63	26.5873	5.89323	.74248	25.1031	28.0715

Table III



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 class II skeletal relationship and to assess its reliability in differentiating a class II skeletal base from a class I skeletal base.

The mean Beta value obtained for the class II group was 26.6^0. The corresponding values obtained in the Baik [6] study were 24.5^0. 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 of <31^0 can be considered to be of Class II skeletal group.

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 30.25^0 has 80% sensitivity and 73% specificity for considering it under the Class II skeletal group when compared to Class I group. It implies that above the Beta angle value 31^0, chance for Beta measurement to come under Class II group is relatively less. That means, the Beta values below 31^{0}can be considered as class II. The values achieved in this study almost coincide with the mean Beta value [26.6] ± 1 SD of the Class II ANB group.

SUMMARY AND CONCLUSION

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

1. Beta angle value less than 31^{0} is can be considered as a Class II 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.

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