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**Orthodontology**

# BETA ANGLE VALUE FOR SKELETAL CLASS I MALOCCLUSION IN MALABAR POPULATION- A RADIOGRAPHIC STUDY

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**ABSTRACT** This study aims to obtain a class I range for Beta angle, an angle used for measuring sagittal skeletal base relationship. 30 pre-treatment cephalograms were grouped in to a class I group based on angle ANB, from 123 lateral cephalograms. The Beta angle values obtained were analysed and the mean value of Beta angle for class I is obtained as 30-39degrees

**KEYWORDS** : Beta angle, sagittal jaw discrepancy

## INTRODUCTION

Routinely, the ANB angle by Riedel, 1952 1.2 and the Wits appraisal byJacobson, 1975 3 have been considered as the most common cephalometric tools for assessing anteroposterior 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 counter-clockwise rotation of the jaws relative to the cranial reference planes also affects the ANB angle reading.[4, 5]

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 Ververidou6. A line is extended form the centre 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, with the majority speaking Malayalam language having Dravidian ethnicity.
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This study is being undertaken to estimate Beta angle values for Malabar population.

## AIM and OBJECTIVES

To obtain the Beta angle values for Malabar population in Class I skeletal relationships

## 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. 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 centre 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 midsagittal plane. In anthropology it is called as Supramentale

C – Centre of condyle. Located by tracing the head of the condyle and approximating its centre

Utilizing these landmarks, various linear and angular measurements were valued

## Angular Measurements

SNAThe Postero-inferior angle between the lines SN and NA

SNBThe Postero-inferior angle between the lines SN and NB

ANBThe 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 0–30 was the criterion for including the samples in to Class I group. In each patient, the Beta angle were measured and tabulated
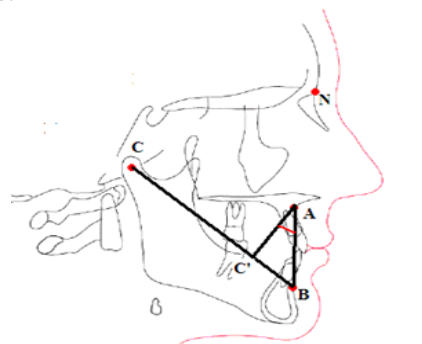


**Fig. 1. THE BETA ANGLE**

## RESULTS

The mean value for Beta angle in the Class I group was observed to be 33.78°, with a standard deviation of 4.7.

**TABLE 1 Beta Angle for Class I subjects with ANB value 0-3 degrees**

| NO | AGE | SEX | ANB | Beta |
|----|-----|-----|-----|------|
| 1 | 14 | M | 3 | 24 |
| 2 | 13 | F | 3 | 33 |
| 3 | 19 | F | 3 | 34 |
| 4 | 20 | F | 1 | 36 |
| 5 | 13 | F | 2 | 27 |
| 6 | 13 | F | 2.5 | 28.5 |
| 7 | 14 | M | 2 | 33 |
| 8 | 14 | M | 0 | 36 |
| 9 | 20 | M | 1 | 30 |
| 10 | 18 | F | 2.5 | 45 |
| 11 | 12 | M | 0 | 34 |
| 12 | 18 | M | 2 | 37.5 |
| 13 | 13 | M | 2 | 30.5 |
| 14 | 16 | M | 2 | 35 |
| 15 | 18 | M | 1 | 37 |
| 16 | 16 | F | 1.5 | 34 |
| 17 | 17 | F | 3 | 30.5 |
| 18 | 19 | F | 0.5 | 40 |
| 19 | 13 | F | 3 | 32 |
| 20 | 18 | F | 3 | 27 |
| 21 | 22 | F | 0 | 42 |
| 22 | 20 | F | 2.5 | 37 |
| 23 | 15 | F | 2.5 | 29 |
| 24 | 12 | F | 3 | 31 |
| 25 | 19 | F | 3 | 31 |
| 26 | 12 | F | 1.5 | 36 |
| 27 | 14 | F | 2 | 36.5 |
| 28 | 20 | M | 1.5 | 41 |
| 29 | 16 | F | 1 | 35 |
| 30 | 15 | F | 3 | 31 |

**TABLE 2 Mean and standard deviation of Beta values**

| N | Mean Beta | Std Deviation | Std Error | 95% confidence interval for Mean | |
|---|-----------|---------------|-----------|-----------------|-------------|
| | | | | Lower bound | Upper bound |
| 30 | 33.7833 | 4.71915 | .86160 | 32.0212 | 35.5455 |

## DISCUSSION

ANB angle is the most commonly used parameter among measurements used to assess the antero-posterior skeletal jaw relationships2. The validity of these parameters has been investigated by many clinicians and researchers. Jacobson3, 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 Nanda8 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. To eliminate these distorting effects of these parameters; many geometric correction methods of have been introduced 9, 10. But these involve complicated procedures.

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. All 30 cephalograms traced were included in the study.

The mean Beta value obtained for the class I group was 33.780. The corresponding values obtained in the Baik 6 study were 31.10. 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 analysed. So a Beta angle value of 30 -390 can be considered to be of Class I skeletal group. While the study was being carried out by repeated watching, right angle triangle ABC', it was inferred that the angle at C being right angle, Angle BAC' was measured as Beta angle, the remaining angle of triangle namely Angle ABC was evidently 90 – Beta. This gave away to thinking to project this Angle ABC' hitherto not mentioned or measured could be an easier parameter for evaluating sagittal skeletal relationship. This concept if accepted

- Will eliminate the need for constructing the perpendicular AC'.
- Relative haziness of point A in comparison to pint B will be largely masked.
- Shift the angular measurement to a much clearer area and a better defined point B.

## SUMMARY AND CONCLUSION

The present study was undertaken to evaluate the reliability of Beta angle in assessing sagital apical base relationship cephalometrically. From the findings obtained in the present study, it can be observed that Beta angle is a valuable parameter based on specificity and sensitivity. Beta angle measurement can be recommended as additional or alternative parameter to angle ANB. The summary of the present study is that subjects with a Beta angle between 300 and 390 have a Class I skeletal pattern.

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