AN ANALYSIS OF VARIATION OF ANGLE ANB AND ITS EVALUATION WITH‘WIT’S APPRAISAL IN SKELETAL CLASS II MALOCCLUSION

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ABSTRACT:

Objective: This study aimed to analyze the variation of angle ANB and its evaluation with ‘Wits’ appraisal in skeletal class II malocclusion cases with angle ANB measuring between 4 and 8 degrees.

Material and Methods: The present study was conducted on forty lateral cephalometric radiographs of 40 subjects in the age group of 10 to 20 years, with skeletal class II malocclusions. The angle SNA, SNB and angle ANB are measured for each case and ‘Wits’ appraisal is calculated by the horizontal distance between the perpendicular line drawn on the occlusal plane from point A and B.

Result: Wits appraisal showed statistically very high significant correlation of variability when compared to ANB. According to study there was a statistically significant core relation between two parameters but r-value (co-efficient of correlation) was less compared to other studies. The ‘Wits’ appraisal shows high co-efficient of variability when compared to ANB.

Conclusion: The high co-efficient variability of Wits’ appraisal signifies a dissimilar apical base relation of maxilla and mandible in cases with similar ANB angle. Hence ‘Wits’ appraisal is a better indicator of sagittal jaw position when compared to ANB angle.

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INTRODUCTION:

Since the introduction of angle ANB by Riedel in 1952, it has become one of the most popular means for evaluating the cephalometric evaluation of the anteroposterior (AP) relationship of the apical bases. The angle ANB is widely used to describe the skeletal discrepancies between maxilla and mandible. However its reliability as a true indicator for sagittal jaw relationship has been questioned. The criticism has been based upon the fact that naison is not a fixed point and any change in its position would affect ANB.
The magnitude of angle may also be affected by jaw rotations occurring during growth and treatment.

In an attempt to eliminate the inherent variations and problems associated with relying on ANB, Jacobson suggested an alternative method of assessing sagittal or AP jaw relationship which is independent of apical base relationship to cranial landmarks. Jacobson and other several authors have demonstrated use of perpendiculars drawn from point A and point B to the occlusal plane as an alternative means to assess apical discrepancies. This method has been commonly referred to as 'Wits' appraisal. At first the 'Wits' appraisal might appear to be rather simple measurement. However closer study shows it to be complex measurement depending upon the close interaction of sagittal and vertical growth of maxilla and mandible and the angulation of the occlusal plane. The 'Wits' appraisal is a diagnostic aid which enables the severity of degree of anteroposterior jaw disharmony to be measured from a lateral cephalometric head film. Briefly, the method entails drawing perpendiculars from points A and B on the maxilla and mandible, respectively, onto the occlusal plane. The points of contact of the perpendiculars onto the occlusal plane are labeled AO and BO coincided, whereas in males point BO was located approximately 1mm ahead of point AO. The 'Wits' reading in females having a normal occlusion would thus be 0, whereas in males it would be -1mm. The ANB angle (the difference between the SNA and SNB angles) is most commonly used measurement in appraising horizontal jaw disharmony. The ANB reading, however, does not take into consideration the relative relationship of denture bases to cranial reference planes. The singular advantage of the 'Wits' appraisal is that it overcomes this shortcoming and concomitantly emphasizes an awareness of this relationship in the overall interpretation of cephalometric analysis. The 'Wits' appraisal is thought to be a more reliable measure of anteroposterior jaw relationship.

The purpose of present study is to analyze ANB and its evaluation with 'Wits' appraisal in class II malocclusion cases with angle ANB measuring between 4 to 8 degrees.

**MATERIALS AND METHODS:**

The present study was conducted on forty pretreatment lateral cephalometric radiographs of 40 subjects of Bangalore city in the age group of 10 to 20 years, with skeletal class II malocclusions. In this study forty pretreatment lateral cephalometric radiographs of 20 males subjects and 20 female subjects between the ages of 10 years and 20 years were selected on the basis of exhibiting class II skeletal malocclusions with angle ANB between 4 to 8 degrees. These radiographs were selected at random from out patient records of patient residing in Bangalore who had reported for orthodontic treatment at Govt Dental College, Bangalore. No subject had undergone any previous orthodontic therapy. All the radiographs were taken at the Department of Oral Medicine and Radiology in a Trophy Radiology Cephalometer using 85 KV and 10MA and exposure time of 1.25 seconds on 15 inches was used. The subject was positioned in the cephalometer with Frankfurt horizontal plane parallel to the ground. Each radiograph was traced on acetate paper of 0.003 inch thickness using a 0.3mm lead pencil. The anteroposterior angular relationship of the maxilla and to the mandible and cranial base as described by ANB and
the anteroposterior linear relationship of the maxilla to mandible as described by perpendicular lines from point A and B on the functional occlusal plane.

The cephalometric points, planes and angles used in this study.
- S-Sella: The midpoint in the outline of Sella Turcica determined by inspection
- N-Nasion: The most anterior point midway frontal and nasal bone on the fronto nasal suture.
- A-Point A: Deepest point in midline between the anterior nasal spine and alveolar crest of maxilla.
- B-Point B; The deepest point in midline between the alveolar crest of mandible and mental process.
- Angle SNA
- Angle SNB
- Angle ANB
- AO: Perpendicular from point A to occlusal plane.
- BO: Perpendicular from point B to occlusal plane.
- Functional Occlusal Plane: Occlusal plane drawn through the intercuspatation of molars and premolars.

The angle SNA, SNB and angle ANB are measured for each case and ‘Wits’ appraisal is calculated by the horizontal distance between the perpendicular lines drawn on the occlusal plane from point A and B.

STATISTICAL ANALYSIS:

The measured values are tabulated and subjected to statistical analysis. The calculations were done separately for male and female subjects of the sample. Co efficient of variation and Co efficient of correlation were calculated. Correlation of ANB with Wits was calculated by Pearson’s correlation test. Values were measured as Mean ± Standard deviation.

RESULTS

The mean SNA, SNB and ANB were 81,93,75,93 and 6 respectively. The mean Wits appraisal was 3.13. The standard deviation of ANB was 1.24 and Wits was 1.65. There was a statistically significant correlation between ANB and Wits with r = 0.49. The Wits appraisal showed statistically very high significant correlation of variability (52.72) when compared to the ANB (20.67).
DISCUSSION:

The Angle ANB relates the anterior apical bases of the maxillary and mandibular dentition to the skeletal base. Angles SNA, SNB and ANB were first used by Downs and are still considered popular criteria for distinguishing dentoskeletal problems from problems from purely dental problems.

Nanda R.S demonstrated that changes in angle ANB could be a resultant of differential amounts of increase or decrease in angle SNA and SNB which behave independently of one another and are rather difficult to predict.

Another variable that is believed to influence the growth changes in angle ANB is effect of growth changes in angle S-N to the mandibular plane, as well as closing or opening growth rotation of the mandible. Studies by Freeman, Taylor and Jacobson reiterate that angle ANB is not a reliable basis for identifying unharmonious jaw relationships. Jacobson presented a ‘Wits’ appraisal based upon the relationship of Point A and Point B relative to the occlusal plane the assumption was that this appraisal was closest to the area of the dental and skeletal base relations and prone to less variation when compared to angle ANB.

The ‘Wits’ appraisal is thus intended not as a single diagnostic criterion but as an additional measurement which may be included in existing cephalometric Analysis to aid in the assessment of degree of anteroposterior jaw disharmony. The Wits appraisal thus provides a reliable indication of extent or severity of anterior posterior skeletal disharmony of the jaws.

In this study, the average values for SNA, SNB, ANB and Wits for the combined values of both male and female subjects are respectively. The mean value for SNA is 81.93; SNB is 75.93, ANB is 6.00 and that of Wits is 3.13. Standard deviation for SNA and Wits are 1.24 and 1.65 respectively. The relationship between ANB and Wits Karl Person’s correlation co-efficient (r) was applied for combined values of both male and female subjects. The reading is 40.49 which show that it is statistically correlated.

The significant correlation coefficient among ANB angle and Wits appraisal denotes that these parameters are closely related to each other and may be used inter changeably. The
correlation co-efficient between the Wits appraisal and ANB angle is lower in the present study compared to that found by other studies (Bishara ET AL., Jarvinen, Richardson). Various authors have considered the degree of correlation between the Wits appraisal and skeletal base indicators. Rotberg ET AL and Bishara ET AL in particular have investigated it correlation with angle ANB. These appear general agreements.

In the present study there was very high correlation of variability of Wits appraisal when compared to the angle ANB was noted, this supports the investigations of the Oktay Bishara ET AL in 1983 in their study showed a significant correlation between the ANB and Wits appraisal, but the r-values were relatively low (0.63), but this is little bit high when compared to the study.

The age changes in angle ANB and Wits appraisal was studied by Bishara ET AL and noted a significant age changes in angle ANB but there was no changes in Wits appraisal.

In the present study the cephalograms were selected considering the angle ANB in the range of 4 – 8 degrees. Hence the coefficient of variability was not significant but a large co-efficient of variability of Wits appraisal suggests a different apical base relationships of maxilla and mandible, eventhough angle ANB were similar, hence our study supports the claim of Bishara ET AL and others who claimed that Wits appraisal is better indicator of the saggital apical base relationship of maxilla and mandible.

In assessing individual malocclusion the variation between ANB angle or the Wits measurement and an average figure is of very little practical importance. The information required from cephalometric Analysis relates to the nature and severity of malocclusion and to what extent the positions of teeth can be altered within the limits dictated by the relationship of the maxillary and mandibular dental bases and whether such alterations can be achieved by simple tipping movement or whether more complex bodily movement would be required.

The Wits appraisal is a linear measurement and not an analysis per se. it is simply an adjunctive diagnostic aid which may prove useful in assessing the extent of anteroposterior skeletal displasias and in determining the reliability of ANB angle.

CONCLUSION:

In this study 40 lateral cephalometric radiographs of 20 male subjects and 20 female subjects selected randomly from the out patient records in the department of orthodontia were used. All the subjects had class II skeletal malocclusion with ANB measuring between 4 and 8 degrees and their ages ranged from 10 to 20 years. The cephalograms were taken with standard means.

Statistical calculations of mean, standard deviation, co-efficient of variability, co-efficient of correlation were done.

The average values are worked out for SNA, SNB, ANB and Wits for the combined values of both male and female subjects respectively. The mean value for SNA is 81.93, SNB is 75.93, ANB is 6.00 and that of Wits is 3.13. Standard deviation for SNA and Wits are 1.24 and 1.65 respectively.

The relationship between ANB and Wits Karl Person’s correlation co-efficient (r) was applied for the combined values of both male and female subjects. The reading is +0.49, which shows that, it is statistically correlated.
According to the study there was a statistically significant correlation between the two parameters but r-value was less compared to other studies.

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