INTRODUCTION

The orthodontic records, which include history examinations and diagnostic records, are mandatory for making a diagnosis and treatment planning. The importance of proper diagnostic records become more evident when it is realized that orthodontic anomalies exist in all three planes. One of the most commonly used plane is antero-posterior plane. Antero-posterior skeletal relationship is measured by using different cephalometric analyses. ANB angle in the Steiner’s analysis is used for the evaluation of anteroposterior skeletal relationship. It determines the magnitude of the skeletal jaw disharmony and in a normal face and ranges from 1 to 5 degrees. However ANB angle has few limitations. A false value can be measured with altered antero-posterior and vertical position of nasion, change in vertical face height and alteration of SN plane. Wits analysis was developed to overcome the drawbacks of ANB angle. Wits also has certain limitations e.g. misinterpretation due to variability in the occlusal plane.

Various studies have reported correlations between different cephalometric parameters for evaluating the anteroposterior jaw relationship. It was found in one study, that correlations existed between A-B plane and ANB angle with ‘r’ value 0.794, for ANB and Wits appraisal ‘r’ value being 0.29 and for Wits appraisal and beta angle ‘r’ value being 0.377. That study concluded that statistically positive correlation existed between different parameters.

The purpose of this research was to determine the correlation of ANB angle and Wits appraisal for assessing the antero-posterior skeletal relation in different malocclusion groups.

MATERIAL AND METHODS

Sample size was calculated by using PASS software. There were 100 Orthodontic patients, out of which 30 were males and 70 were females. The investigations were based on a cross sectional sample. Patients having complete permanent dentition up to first permanent molar, patients having Angle’s class I, class II division I and class III malocclusion, with no supernumerary tooth were included in the study. While, exclusion criteria were patients having previous orthodontic treatment, patients with class II division II malocclusion and patients having any asymmetry of jaws.

OBJECTIVE: The purpose of this study was to determine the correlation of ANB angle and Wits appraisal in Angle’s class I, class II division I and class III malocclusion groups.

MATERIAL AND METHODS: Lateral cephalograph was taken to measure the ANB angle and Wits appraisal in angle’s class I, class II division I and class III malocclusion groups.

RESULTS: The correlational analysis of ANB angle in the three malocclusion classes showed, that there was a weak correlation of ANB angle in all three malocclusion groups but statistically significance (P-value < 0.05) in class II division I and class III malocclusion.

CONCLUSION: This research concluded that, there is a weak correlation between ANB angle and Wits appraisal in all three malocclusion groups but it is statistically significant in class II div I and class III malocclusion.

KEY WORDS: ANB angle, Wits appraisal, Anteroposterior jaw relationship.


CORRELATION OF ANB ANGLE AND WITS APPRAISAL IN DIFFERENT MALOCCLUSION GROUPS

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Three groups were made according to Angle’s classification i.e. class I, class II division I and class III molar relationship. Pre-treatment lateral cephalograph was taken with the patient’s Frankfurt horizontal plane parallel to floor. Each radiographic film was traced on acetate tracing paper. On cephalograph, the ANB angle was measured by drawing two lines from nasion to point A and nasion to point B.

For Wits appraisal, bisected occlusal plane was drawn and then perpendicular was dropped from point A and point B that were called as AO and BO point respectively. Linear measurement between AO and BO point was measured. The collected data was analyzed with the help of SPSS for windows version 17. Pearson correlation was used to assess relationships between different study variables. P value <0.05 was considered significant.

RESULTS

The age of study participants ranged from 11 to 38 years with a mean of 16.13 (± 3.177) years. There were 40 class I malocclusion patients, 46 class II division I malocclusion patients and 14 class III malocclusion patients. The overall mean ANB angle was 3.66 ± 3.611 degrees with minimum value of -7 to a maximum value of 10 degrees. The mean ANB angle in different malocclusion groups are shown in table 1.

The measurement of Wits appraisal also had a vast distribution with a minimum measurement of -11 mm to a maximum value of 9 mm with overall mean value of 2.571 (± 4.8377 mm). The mean Wits appraisal measurements according to different malocclusion groups are shown in table 2.

The correlational analysis of ANB angle and wits appraisal with all malocclusion groups is shown in table 3, 4 and 5.

<table>
<thead>
<tr>
<th>Malocclusion group</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>40</td>
<td>0.5</td>
<td>7</td>
<td>4.14</td>
<td>2.761</td>
</tr>
<tr>
<td>Class II Division I</td>
<td>46</td>
<td>2.5</td>
<td>10</td>
<td>5.48</td>
<td>1.877</td>
</tr>
<tr>
<td>Class III</td>
<td>14</td>
<td>-7</td>
<td>4</td>
<td>-2.27</td>
<td>4.047</td>
</tr>
</tbody>
</table>

Table 1: Distribution of ANB angle (degrees) with respect to malocclusion groups

<table>
<thead>
<tr>
<th>Malocclusion group</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>40</td>
<td>-3.0</td>
<td>7.0</td>
<td>2.466</td>
<td>3.3272</td>
</tr>
<tr>
<td>Class II Division I</td>
<td>46</td>
<td>2.0</td>
<td>9.0</td>
<td>5.700</td>
<td>5.7003</td>
</tr>
<tr>
<td>Class III</td>
<td>14</td>
<td>-11.0</td>
<td>2.0</td>
<td>-2.977</td>
<td>4.7696</td>
</tr>
</tbody>
</table>

Table 2: Distribution of wits appraisal with respect malocclusion groups

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Wits appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>0.100*</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.513</td>
</tr>
<tr>
<td>N</td>
<td>40</td>
</tr>
</tbody>
</table>

* The Correlation is Insignificant at 5% level of significance

Table 3: Correlation of ANB angle with Wits appraisal in class I

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Wits appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>-0.0411**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.218</td>
</tr>
<tr>
<td>N</td>
<td>46</td>
</tr>
</tbody>
</table>

** The Correlation is significant at 5% level of significance

Table 4: Correlation of ANB angle with Wits appraisal in class II division I

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Wits appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>0.0412**( )</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.036</td>
</tr>
<tr>
<td>N</td>
<td>14</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.05 level (2-tailed)

Table 5: Correlation of ANB angle with Wits appraisal in class III
DISCUSSION

In analysis and management of orthodontic case, anteroposterior relation between jaws is critical. Correction of sagittal relationship is much important in obtaining harmonized and well proportionate face after orthodontic treatment. Many parameters are designed to determine the anteroposterior relation.

The aim of this study was to determine whether correlation exists between ANB angle and Wits appraisal. Both are measured cephalometrically to evaluate sagittal skeletal relationship.

A number of factors influence measurement of ANB angle including anteroposterior and vertical measurements: facial prognathism, age, and the growth of the jaws in relation to the cranial reference planes.

The rotation of jaws is majorly related with the facial morphology of the individual. The average measurements are more for dolicocephalic pattern in comparison with mesocephalic and brachycephalic faces, but facial type does not have an effect on the correlation between parameters.

In this study there were 30 males and 70 females. There were more female subjects present as the sample was not collected on the basis of gender.

For ANB angle and Wits appraisal, a positive correlation was expected because these parameters evaluate the jaw relation in the anteroposterior plane. But variations can occur, which is probably due to the fact that both parameters are measured on different landmarks. ANB angle depends on position of nasion, angulation of the SN line and maxillary inclination while Wits appraisal depends on occlusal plane, vertical position of teeth and vertical and anteroposterior position of point A and B. These are different variables and should be considered when ANB is interpreted. Change in anteroposterior and vertical position of point N, point A and point B will affect the degree of ANB angle but not on the original anteroposterior relation of face. Along with that the angulation of the occlusal plane also cause change in the ANB angle, although the sagittal relationship remains stable.

In few studies a low association was seen between overjet and Wits appraisal. In assessment of wits appraisal either occlusal plane can be used i.e bisected occlusal plane and functional occlusal plane. 5 degrees change in occlusal plane may affect the wits appraisal by 3-6 mm. Wits appraisal assessed on bisected occlusal plane had more reproducibility values as compared to functional occlusal plane.

Oktay studied the relation of ANB angle and Wits appraisal in high and low occlusal plane and concluded that, there was more discrepancy between ANB angle and Wits appraisal in high occlusal plane angle group and as compared to low angle.

Anterior facial height is most influencing point in assessment of ANB angle. Changes in occlusal plane angle affect the assessment of ANB angle and Wits appraisal. Some studies showed that ANB angle overestimate anteroposterior position of jaws in high occlusal plane angle, or Wits appraisal underestimate anteroposterior position of the jaws. While in low occlusal plane ANB angle was confirmed by the Wits appraisal assessment.

Our study is comparable with those studied by Zupancic et al in which there was correlation only in class II division I.

CONCLUSION

In this study it was determined that all malocclusion groups showed weak correlation between ANB angle and Wits appraisal but it is statistically significant only in class II division I and class III malocclusion.

REFERENCES