# ANB+AOBO ZONE INDEX (APPLICABILITY TO PAKISTANI POPULATION)

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#### ABSTRACT

Sagital skeletal discrepancy is being evaluated Cephalometrically by using ANB angle and the Wit's value. Ideally the 2 values should reflect the same degree of Sagital discrepancy but both assessments have their weaknesses: the value of ANB angle is subject to many variables in the dentofacial complex and the Wit's value depends on correct location or representation of the occlusal plane. ANB+AOBO zone difficulty index was established by Polk et al to overcome the weaknesses associated with the ANB & Wit's values. Aim of this study was to apply the proposed index on Pakistani population and assess its reliability. Results showed that the new index measure the jaw discrepancy more accurately as it gives us a new approach of assessing the treatment difficulty.

Key words: ANB Angle, Wit's Value, ANB+AOBO zone Index

### INTRODUCTION

Different cephalometric methods have been used in the past to assess the sagital skeletal discrepancy. Most commonly used methods being the ANB value and the Wit's value. ANB angle<sup>1, 2, '3.4, 5</sup> is measured by subtracting the SNB angle from the SNA angle. Normal value is  $0-4^{\circ}$  with the mean value of  $2^{\circ}$ . Normal value represents the Skeletal Class I. Value more than 4° represents Skeletal Class II while value less than 0° represents Skeletal Class III. The ANB value is subject to many variables in the dentofacial2'3,4lex: Head position (if not natural head position), vertical pattern of growth, anteroposterior & vertical position of Nasion & orientation 6, 7, 8, 9, 10 of SN Plane all effects the ANB value Thus ANB value is not a true reflection of the Sagital skeletal discrepancy.

Wit's value<sup>11</sup> <sup>12</sup> <sup>13</sup> is defined as the difference between 2 points on the occlusal plane, which are created when perpendiculars are drawn to the occlusal plane from points A & B. The normal values are 0, -1 mm. Generally positive values represent Class II while negative values represent Class III. This value has its own limitations as it is dependent on the correct location and representation of occlusal plane.

The 2 values should be similar but due the above mentioned weaknesses these do not accurately reflects the sagital skeletal discrepancy. To overcome these limitations a new index was proposed in 2003 by Polk et al i.e. ANB + AOBO index". The aim o10is study was to apply this index on Pakistani sample to assess its accuracy & reliability

#### Purpose of this study is

- To apply ANB + AOBO index on Pakistani population to assess its accuracy & reliability
- To establish the co-relation between the ANB angle, Wits value & ANB + AOBO index.

#### MATERIALS AND METHODS

A cross sectional descriptive study was conducted on 73 patients (44 females & 29 males) aged 14-18 years. Patients were excluded due to the lack of data if their pretreatment ANB values were less than  $-4^{\circ}$  or greater than  $10^{\circ}$ , or their AOBO values were less than -7mm or greater than 8 mm. Exclusion criteria also includes:

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- Apert's syndrome, Cleido-cranial dysplasia, Pier Robbins syndrome e.t.c)
- 2. Children with facial asymmetry
- 3. Children with CO-CR shift
- 4. Children with supernumerary or congenitally missing teeth
- 5. Children who are undergoing with orthodontic treatment
- 6. Children with functional mandibular shift

Sample was collected using the non-probability convenience sampling technique.

Lateral Cephalograms were taken in natural head position for each patient and were traced and analyzed. To assess ANB angle, SNA angle & SNB angle were determined while to assess Wit's value difference between AO and BO was assessed. Combined ANB value & AOBO value was then calculated. Subjects were then put in the different zones. (Table I)

## STATISTICAL METHOD

SPSS 10.0 was used for statistical evaluation.

✤ Dahlberg's method was used for the calculation of the operator's random error.25 Lateral Cephalograms were selected at random from the total of 73 available and were reassessed.

The formula being

Sm = 
$$\sqrt{\frac{\Sigma d^2}{2n}}$$

- Sm = The Dahlberg's method error
- d The difference between the two measure-= ments
- number of patients n

Sm 
$$<$$
Qm  $<$  Sm l  $\frac{(x.0225)}{n}$ 

- Q the actual method error
- х n degrees of freedom
- Co-relation between the ANB value. Wit's value & the ANB+AOBO zone index was calculated using Spearman's Bivariate Co-relation.

### RESULTS

The chronological age range of sample was 14-18 years, with a mean age of 16.28 years. The sex distribution was 29 males (40%) and 44 females (60%). The

1. Children with cranio-facial syndrome (clefts, mean age of male patients was 16.25 years and mean age of female patients was 16.33 years. (Fig I)

> Based on the evaluation of ANB angle 30% of the subjects showed Skeletal Class I, 12% showed Skeletal Class III while remaining 54 % showed Skeletal Class II. (Fig 2). It is important to note that 40 % of the cases were normal angle while 60% cases were either low angle or high angle cases.

> Based on the evaluation of Wit's value 15% of the subjects showed Skeletal Class I, 65% showed Skeletal Class II while remaining 20% showed Class III (Fig 3). Results based on ANB angle & Wit's value showed that there is great variation in the distribution of patients in different categories.

> ANB+AOBO zone index showed that 10% subjects were in Zone 0, 5% in Zone -1, 3% in Zone -2 while 10% in Zone <-2. It was also found that 28% in Zone 1. 22% in Zone 2, 15% in Zone 3, 3% in Zone 4 while remaining 4% in Zone > 4. Cases in pretreatment Zones of 0 were easier to treat while increase or decrease in Zones made the treatment difficult. (Fig 4)

> Thus Zone Index gives us a different approach where by we assess the difficulty of treatment rather









Fig 3







Fig 5

TABLE 1

Zone	ANB+AOBO Zon range values			
4	16 to 20			
3	12 to 16			
2	8 to 12			
1	4 to 8			
0	0 to 4			
-1	0 to -4			
-2	8 to4			

## **TABLE 2: CORRELATIONS**

	ANB	AOBO
ANB Pearson Correlation	1.000	.811**
Sig. (2-tailed)	•	.000
Ν	73	73
AOBO Pearson Correlation	.811**	1.000
Sig. (2-tailed)	.000	
Ν	73	73

\*\* Correlation is significant at the 0.01 level

**TABLE 3: CORRELATIONS** 

	ANB	INDEX
ANB Pearson Correlation	1.000	.974**
Sig. (2-tailed)		.000
Ν	73	73
INDEX Pearson Correlation	.974**	1.000
Sig. (2-tailed)	.000	
N	73	73

\*\* Correlation is significant at the 0.01 level

 TABLE 4: CORRELATIONS

	INDEX	AOBO
<b>INDEX</b> Pearson Correlation	1.000	.956**
Sig. (2-tailed)		.000
Ν	73	73
AOBO Pearson Correlation	.956**	1.000
Sig. (2-tailed)	.000	
Ν	73	73

\*\* Correlation is significant at the 0.01 level

than the measure of Skeletal Pattern of the patient. This approach seemed versal4.e realistic and clinically applicable.

## DISCUSSION

The ANB angle and the AOBO measurements can not be used separately to assess Skeletal sagital discrepancy with 100% accuracy<sup>6 7</sup> 8 <sup>910</sup>, but combining the two measurements creates a more valid method of quantifying jaw relationships. Polk et al organized the relationships in 7 zones predictive of treatment time & difficulty. The myth in their approach was that e.g. if ANB angle is affected by protruded jaws or clockwise rotation ofjaws then addition of AOBO will adjust the sum and more accurately suggests the lower zone & vice versa. It is important to note that as the zone of difficulty become more positive and approach Class II, the difference of AOBO measurement from ANB angle decreases and may take a negative value and vice versa". The results of this study were comparable and showed that this new method reduces the limitations of

	N	Mean	Std. Deviation	Std. Error Mean
ANB	73	4.2877	4.2938	.5026
AOBO	73	1.4178	4.7067	.5509
INDEX	73	5.7055	8.5663	1.0026

# TABLE 5: ONE-SAMPLE STATISTICS

Test Value = 0					
			Mean	95% Confidence Interval of the Difference	
t	df	Sig. (2-tailed)	Difference	Lower	Upper
8.532	72	.000	4.2877	3.2858	5.2895
2.574	72	.012	1.4178	.3197	2.5160
5.691	72	.000	5.7055	3.7068	7.7041
	<b>t</b> 8.532 2.574 5.691	t         df           8.532         72           2.574         72           5.691         72	t         df         Sig. (2-tailed)           8.532         72         .000           2.574         72         .012           5.691         72         .000	Test Value = 0           t         df         Sig. (2-tailed)         Mean           8.532         72         .000         4.2877           2.574         72         .012         1.4178           5.691         72         .000         5.7055	Test Value = 0           t         df         Sig. (2-tailed)         Mean         95% Conditative           t         df         Sig. (2-tailed)         Mean         Difference         Lower           8.532         72         .000         4.2877         3.2858           2.574         72         .012         1.4178         .3197           5.691         72         .000         5.7055         3.7068

## ONE-SAMPLE TEST

both the individual methods to a great extent and thus can be applied more effectively.

Distribution of patients in different zones is shown in Fig 5 which defines that maximum number patients were in Zone -1,0 & 1. Thus as the difficulty zone increases the patient falling in that particular zone also decreases.

Co-relation was also calculated in the present study between the different assessing methods. There was an insignificant Co-relation between ANB angle and Wit's value (Table 2), between ANB angle and index (Table 3) and AOBO value and index (Table 4). Thus an attempt to find one from the other will not be reliable.

This new index needs to be applied on a larger sample and verification of pretreatment difficulty zone after applying to treated cases is required. This will further help to assess whether difficulty zones effectively reflects the treatment time and the difficulty of cases or not.

### CONCLUSION

For Pakistani Population sample

- ✤ 10% of the subjects were in Zone 0 (least difficult zone), 5% in Zone -1 while 28% were in Zone 1
- ✤ Representation in more difficult zones was little.
- Insignificant co-relation was found between ANB value and AOBO distance
- Insignificant co-relation between ANB & Zone

Index

Insignificant co-relation between Wit's value & Zone Index

Zone index since take care of the limitations of both the individual methods so is thus a more reli

able and effective method of assessing sagital skeletal discrepancy.

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