

# Assessment of Upper Dental Arch Symmetry in Class I Iraqi Adults

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**Abstract:** ***Background:** A wealth of information that obtained from dental cast measurements have significant importance in orthodontic diagnosis and treatment planning, the aim of this retrospective study was to evaluate the symmetry of dental arch in Iraqi adults with class I normal occlusion. **Materials and method:** The sample comprised 60 dental casts (30 males 30 females), aged(18-25). Interpretation of dental arch angular measurements was made by AutoCAD computer program. **Results:** The angular measurements were smaller in the right side of dental arch than the left side, there was no significant gender difference in all variables, no significant difference between right and left anterior arch segment and highly significant difference between right and left posterior arch segments. **Conclusion:** The upper dental arch is asymmetrical in anterior and posterior segments and narrower on the right side than on the left side.*

**Keywords:** dental cast, symmetry, angular measurements

## 1. Introduction

Dental arch form and width are of great importance for determining the success and stability of orthodontic treatment, the harmony of the dental arches plays an important role in maintaining normal occlusion of teeth besides the influence of the orofacial musculature labially, buccally and lingually<sup>(1)</sup>.

Arch shape affects both the function & the esthetic of occlusion, preservation of dental arch shape during growth is an indicator of equilibrium of teeth between the tongue and circumoral muscle forces<sup>(2)</sup>. In arch form studies, attempts have been made to define an ideal arch shape, but considerable individual variation existed<sup>(4,5)</sup>.

In morphological research on facial asymmetry, the relationship between skeletal mandibular deviation and dental arch asymmetry has been evaluated by dental cast analysis.<sup>(6,7,8)</sup>

The aim of this study was to establish new angular measurements of orthodontic dental cast to evaluate the symmetry of each particular segment in the curve of dental arch & to make a normative data for class I dental occlusion, so this study is based on the hypothesis that the dental arch has a symmetrical curve, photographs of the study model method which provide a two – dimensional view and need a standardized lighting and magnification before photographing the cast, and by using a fine lead pencil to identify the points from which the measurement will be taken on photographs<sup>(9,10)</sup>,

After the cast is marked, it's then photographed from an occlusal view with a 35 mm distance from a digital camera. Because photographing requires elaborate equipment, factors of enlargement standardization of object to image distance and lighting, therefore, it's not suitable for epidemiological purposes<sup>(11)</sup>.

## 2. Materials and Methods

For this research, photographs of dental cast were gathered retrospectively from a sample that was selected from Baghdad University, college of dentistry, a total of 200 Iraqi adult dental students were clinically examined & only 60 of them (30 males and 30 females) fit the criteria of this research with an age range between 18 and 25 year old were selected

The criteria of sample were:

- 1) Full permanent teeth excluding third molars.
- 2) Class I incisor classification.
- 3) Bilateral class I molar and canine relationships.
- 4) Class I skeletal relationship, diagnosed clinically by using the two finger technique mentioned by (Foster, 1985).
- 5) No crown and bridge prosthesis or large dental filling.
- 6) No or minor spacing or crowding.
- 7) No pervious orthodontic, orthopedic or facial surgical treatments.

### Dental cast landmarks.

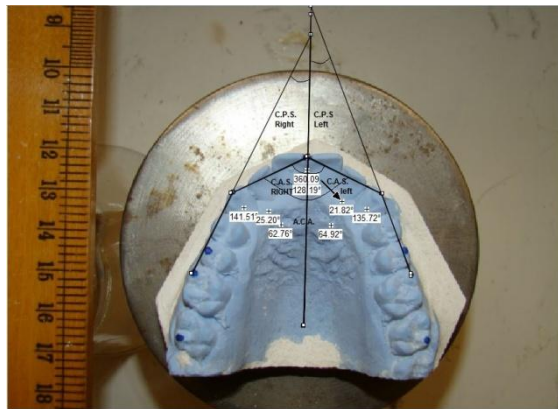
- 1) Incisal point: the point lying midway between the incisal edges of the of the two central incisors<sup>(12,13)</sup>.
- 2) Canine point: the cusp tip of the right and left permanent canines<sup>(14)</sup>.
- 3) Mesiobuccal cusp tip of the first molar the mesiobuccal cusp tips of the right and left first permanent molars<sup>(15)</sup>.
- 4) Incisive papilla point.
- 5) Fovea point.

### Angular measurements:

- 1) Curvature of the anterior segment (CAS) angle: It represents the degree of curvature of anterior segment of dental arch right (RCAS) and left (LCAS), it's formed between the line connecting canine point, incisal point and palatal midline of the dental cast.
- 2) Curvature of the posterior segment (CPS) angle: It represents the degree of curvature of posterior segment of dental arch right (RCPS) & left (LCPS), it's formed

between palatal midline and a line connecting canine point and mesiobuccal point of the first permanent molars.

These angular measurements were analyzed by auto-cad program 2009



**Figure 1:** Angular measurements of upper dental arch

**Statistical Analysis**

Descriptive statistics including the means, standard deviation (SD), Range, and Coefficient variability (CV) for each measurement for both sexes will be calculated. Students t test will be applied to determine any significant sex difference. All analysis done by using SPSS version (2009).

**Table 1:** Shows the mean and standard deviation and T test for male and female group.

	Male N=30		Female N=30		T Test
	Mean	SD	Mean	SD	
Rcas	62.8	3.9	63.1	3.7	0.78
Lcas	63.0	3.5	63.4	3	0.67
Rcps	23.1	4.3	22	3.8	0.68
Lcps	24.7	3.8	24.2	3.9	0.63

\*Statically significant difference P<0.05

\*Degree of freedom = 58

**Table 2:** Shows the mean and standard deviation of variable included in this study for all sample groups regardless the gender

	N	Mean	SD
<b>Rcas</b>	60	62.95	3.8
<b>Lcas</b>	60	63.2	3.25
<b>Rcps</b>	60	22.55	4.05
<b>Lcps</b>	60	24.45	3.85

**Table 3:** Shows paired T test between the variable in right and left side in male and female as one group N =60

Paired test	
rcas-l cas	0.51
reps-lcps	0.000 **

\*Statistically significant difference P<0.05

\*Degree of freedom =59

**3. Results**

Table 1 shows descriptive statistics included mean and standard deviation for the all the variables in this study. It is worth saying that all the angles in right side are smaller than

their analogs in the opposite side. On the other hand T test has been used to investigate the gender difference; it shows no significant difference in all variables between male and female groups. So it's wise to pool all the data into one group regardless the gender group as in table 3 that shows the descriptive statistics of the variables. Additionally all the data have been subjected to paired T test as split mouth technique to investigate the difference between the right and left side. Paired T test shows no significant difference between R.CAS and L.CAS and highly significant difference between R.CPS and L.CPS.

**4. Discussion**

The four angles used in this study can precisely explain the behavior of upper dental arch, since we split the upper dental arch into four segments, as shown in figure (1), the behavior of each segment was investigated in relation to palatal midline as a baseline or fixed reference line. In other words each angle represent the behavior of related segment to the palatal midline, so when any angle increased beyond the normal limit, means increase in the arch width in that particular segment, and vice versa. So according to the above results and the finding of this study the upper dental arch is narrower on the right side than on the left side since the angles of the anterior and posterior segments on the right side are less than those on the left side although the difference between the right and left anterior segments is not significant statistically, while highly significant difference between right and left posterior segments. This will open the door for predication of crowding occurrence on right side more than the left side, because the right dental arch is narrower than left dental arch.

As a result; the nil hypothesis of this study was rejected and the upper dental arch as found to be asymmetrical. This finding was agreed by Paulo et al<sup>(15)</sup>, Hechter<sup>(16)</sup>, Lundstrom<sup>(17)</sup> and Maurica<sup>(18)</sup>. The upper dental arch asymmetry may be due to difference in tonicity of perioral muscles in both sides<sup>(19,20)</sup> since the position of teeth are highly affected and determined by the action of those muscles. The other causative factor for developing malocclusion like heredity<sup>17</sup>, habits and premature loss of primary teeth may act altogether as contributory factors for developing asymmetrical upper dental arch.

Further research is needed to exclude the effect of clenching and parafunction activity from playing a role in development of asymmetrical upper dental arch.

**5. Conclusion**

- 1) The upper dental arch is asymmetrical in anterior and posterior portions although there is no significant difference in anterior portion between left and right sides.
- 2) The upper arch is narrower in right side than in left side.

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