The reliability of bisecting interpupillary perpendicular line, facial and dental laterality and coincidence in adult normal occlusion Iraqi sample (A photographic, cross sectional study)

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ABSTRACT

Background: One of the primary reasons for patient’s to seek orthodontic treatment is esthetic or cosmetic reasons. The purpose of this study is to evaluate facial asymmetry which present in essentially all normal individuals and result from a small size difference between the two sides, evaluate the correlation between maxillary and mandibular dental midlines with facial midline and to determine if there is gender differences in Iraqi adults.

Material & method: The sample consist of 108 Iraqi adults (63 females, 45 males) aged 18-25 years with class I pattern. Clinical examination and digital photograph with cheek retractor were performed for each individual. The facial midline was determined by the perpendicular bisecting of interpupillary distance. Three linear soft tissue measurements to evaluate facial asymmetry and two linear measurements to evaluate the correlation between facial and dental midlines were measured for each photograph using AutoCAD program 2007.

Result: A correlation analysis was performed to determine the correlation between facial and dental midlines. The following results were obtained:

1-The left side of the face is wider than the right side in 63.8% of sample, 0% equal sides and 36.1% wider right side.
2-Chin shifts to the left in 43.5% of the whole sample, 20.3% coincide with Fml and 37% shift to the right.
3-There is no significant relationship between facial and dental midline (maxillary and mandibular).
4-There is direct relationship between maxillary and mandibular dental midline.
5-There was no gender differences in both facial and dental asymmetry.

Key words: facial midline, dental midline, cheek retractor.

INTRODUCTION

Symmetry means exact correspondence of form and constituent configuration on opposite sides of a dividing line or plane or about a center or an axis (1).

Facial aesthetics has exponentially increased its importance in all health fields (2).

A study for Karl and Randy (3) is the first study to show that facial symmetry has a positive influence on facial attractiveness ratings. While Kowner (4) in his study he found that the low degree of facial asymmetry found in normal people does not affect attractiveness ratings.

Facial symmetry is usually considered an important component of a harmonious smile (5). Esthetic appearance is intensified when the maxillary midline coincides with the midline of the face although it is difficult to be achieved, therefore many studied tried to determine how far the maxillary dental midline could deviate from the facial midline and still be considered aesthetically acceptable.

Various anatomic measurements have been proposed to help planning orthodontic, prosthetic, or restorative treatments, with the objective of achieving a pleasant esthetic appearance (6).

Alwazzan et al. (7) used from the nasion to pognion passing over the midline of the philtrum to determine facial midline, while Sharma et al. (8) used the middle of philtrum, both found that facial midline can be used as guide to determine the position of dental midline. While Cardash et al. (9) and Eskelsen et al. (10) used the midpoint of the interpupillary line, or the line from the center of the brows, is typically used to locate the facial midline, they found that it can be considered less attractive from an esthetic standpoint. So because there is no previous Iraqi study about the relationship between the facial midline and dental midline, the present study had been established to find this relationship in both genders.

MATERIAL AND METHOD

The sample consist of 108 Iraqi adults age 18-25 (45 males, 63 females) all of them with Bilateral Class I molar, canine and incisor classification, Class I skeletal relationship.
No crown and bridge prosthesis or large dental fillings, No or minor crowding and spacing, No previous orthodontic or facial surgical treatments, Absence of facial deformity due to ex: facial trauma, abnormal deviation of the nose, deformity of the eye & ear or due to congenital diseases like Cleft lip & palate.

Every participant in the sample passed through four steps: History, Clinical examination (Extra oral and Intraoral examination), Frontal view photograph, Upper & lower dental impression. In History the subjects were asked about name, age, origin, medical history. Extraoral examination includes:

1. Tempromandibular joint examination includes deviation of the mandible from the normal path of closure (11-13). Any person with functional shift of the mandible was excluded from the sample. 2. Assessment of antero-posterior skeletal relationship (14).

For measurements Firstly, the photographs were imported to the AutoCAD program. Secondly, magnification correction was done in reference to the attached ruler. After that, landmarks were identified.

Soft tissue points used in this study include: Points err and erl: were defined as points on the patient’s right and left sides where a line connecting the centers of the ear rods intersects the outer contour of the face (17). Soft tissue menton (me) or gnathion: is the most inferior midpoint on the soft tissue contour of the chin (18) and Pupil's of the eye (P): is a hole located in the center of the iris of the eye that allows light to enter the retina (19).

Lines include: Interpupilary line: is a horizontal line that connects between the center of right and left pupils (17). Facial midline (Fml): was defined as the perpendicular bisector of the Interpupilary line (8,17). Maxillary and mandibular dental midline (Max, Man. dml): can be described as an imaginary vertical line that separates the two central incisors (right and left central incisors) (20).

Linear Measurements: err, erl: The distances from facial midline to points err and erl, and the difference between them is defined as err-erl. If the value of err-erl is zero that mean there is no laterality, if the value of err-erl is less than zero (minus) this indicate wider left hemiface, and the facial midline shifts to the right, if the value of err-erl is more than zero (positive) this indicate wider right hemiface and facial midline shifts to the left (17). dme: is the horizontal distance from facial midline to soft tissue menton (me) (17), if its value is zero this mean (me) coincides with facial midline, if positive this mean (me) shifts to the right, if negative this mean it shifts to the left (17). Max, Man: The horizontal distance from facial midline to the maxillary and mandibular dental midline to check the correlation between facial and dental midline (8). If the value is positive this means that the dental midline shifts to the right, if negative this mean that the dental midline shifts to the left. Max-Man: the horizontal distance between Max and Man (8).

Statistical Analyses which used are:

Orthodontics, Pedodontics, and Preventive Dentistry95
Descriptive statistics, and Inferential statistics which include: Paired samples t-test, Independent samples t-test and Pearson correlation coefficients.

RESULTS AND DISCUSSION
Descriptive statistics for the total sample shows that: the left side of the face is wider than the right side and facial midline shifts to the right. This agrees with Ercan et al., but disagrees with Haraguchi et al. This goes under the explanation of valence hypothesis which suggest that the brain hemispheres differ in processing emotion, these emotions will be expressed in the musculature action. As bone growth itself under loose genetic control and take place in response to growth of the surrounding soft tissue (This according to functional matrix theory by Moss). Maxillary and mandibular dental midline shift to the right. This agrees with the result of Sharma et al., Chin shifts to the left. This agrees with Haraguchi et al., 2008.

Descriptive statistics for both genders shows that: The left side of the face is wider than the right side and facial midline shifts to the right in both genders. This agrees with Ercan et al., but disagrees with Haraguchi et al.. This goes under the explanation of valence hypothesis and functional matrix theory. Maxillary and mandibular dental midline to the right in females. This agrees with the result of Sharma et al., In males they shift to the left which disagree with Sharma et al.. The teeth are appendages of the jaws and are supported by the alveolar bone, the relationship between the upper and lower alveolar bones is not necessarily the same as that between the upper and lower basal bones. Chin shift to the right in females and to the left in males. It agrees with that of Lundström and Woodside, and disagrees with the result of Haraguchi et al.. This explained by the environmental influence on mandible during the growth ex: Unilateral chewing patterns, sleeping on the stomach, resting the chin on the palm of the hand these may cause the chin to, the morphology of the alveolar process and the vertical height of the dentition.

Pearson correlation among all variables for the total sample: table (1) shows that: There is weak but significant correlation between err-erl with Max & Man. This disagrees with Sharma et al., but agrees with the result of Eskelsen et al.. The mechanism that control facial growth are poorly understood, there is an interaction between genetic and environmental factors and it is difficult to distinguish between them. Weak highly significant correlation between err-erl and me. This agrees with Haraguchi et al., which explained by the environmental influence on mandible during the growth. There is moderate, direct, highly significant correlation between Max and Man. This agrees with Sharma et al.

Inferential statistics for comparison between males and females. Table (2) shows that: There is no significant difference present between males and females in all variables except the values of err and erl. This comes forward with Nasir who found out that those females are slightly smaller than males in most dimensions.

Pearson correlation among all variables for both genders. Shows that there is Weak non significant correlation between err-erl and Max, Man. This agrees with Eskelsen et al. and disagrees with Alwazzan et al. and Sharma et al.. Weak non significant correlation between err-erl and me. This agrees with Haraguchi et al., Direct correlation between Max and Man.

This agrees with Sharma et al., The percentage of coincidence among facial midline, maxillary and mandibular dental midline in the total sample is shown in Table 3. The percentage of subjects with wider left side in comparison with subjects with wider right side of the face is shown in Table 4.

The percentage of coincidence and non coincidence between menton and Fml is shown in Table 5.

Direction of shift of Max and Man d ml to the right are 50%, 44.44% respectively and to the left are 34.25%, 39.81% respectively. These results are close to that of Sharma et al., study; the difference may be due to number of the sample. The amount of shift of maxillary dental midline to facial midline, mandibular dental midline to facial midline and maxillary to mandibular dental midline are: 0.46-5.38 mm, 0.33-6.08 mm, 0.5-4.96 mm respectively.

REFERENCES
3. Karl G, Randy T. Human (Homo sapiens) facial attractiveness and sexual selection: The role of


15. Al-Ramahi SC. Evaluation of Buccal Corridor in Posed Smile for Iraqi Adults Sample with Class I Normal Occlusion.2009


<table>
<thead>
<tr>
<th>Variables</th>
<th>r</th>
<th>P-value</th>
<th>sig</th>
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<tbody>
<tr>
<td>(err-erl) &amp; Max</td>
<td>0.197</td>
<td>Weak</td>
<td>0.049</td>
</tr>
<tr>
<td>(err-erl) &amp; Man</td>
<td>0.362</td>
<td>Weak</td>
<td>0.04</td>
</tr>
<tr>
<td>(err-erl) &amp; menton</td>
<td>0.304</td>
<td>Weak</td>
<td>0.03</td>
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<tr>
<td>Max &amp; Man</td>
<td>0.778</td>
<td>strong</td>
<td>0.000</td>
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</table>

Table 2: Independent t-test and probability value for comparison between females and males:

<table>
<thead>
<tr>
<th>err</th>
<th>erl</th>
<th>(err-erl)</th>
<th>Max</th>
<th>Man</th>
<th>Max-Man</th>
<th>dme</th>
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<tbody>
<tr>
<td>Fml</td>
<td>dml</td>
<td>Menton</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>t-test</td>
<td>7.989</td>
<td>2.65</td>
<td>0.72</td>
<td>1.756</td>
<td>0.337</td>
<td>0.229</td>
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<tr>
<td>P-value</td>
<td>0.007</td>
<td>0.043</td>
<td>0.40</td>
<td>0.086</td>
<td>0.736</td>
<td>0.820</td>
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<tr>
<td>Sig</td>
<td>S</td>
<td>S</td>
<td>NS</td>
<td>NS</td>
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Table 3: The percentage of coincidence among facial midline, maxillary and mandibular dental midline in the total sample:

<table>
<thead>
<tr>
<th></th>
<th>Coincide with err-erl</th>
<th>Not coincide with err-erl</th>
<th>Shift to right</th>
<th>Shift to left</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>17</td>
<td>91</td>
<td>54</td>
<td>37</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>15.7%</td>
<td>84.25%</td>
<td>50%</td>
<td>34.25%</td>
<td>100%</td>
</tr>
<tr>
<td>Man</td>
<td>17</td>
<td>91</td>
<td>48</td>
<td>43</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>15.7%</td>
<td>84.25%</td>
<td>44.44%</td>
<td>39.81%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4: The percentage of subjects with wider left side in comparison with subjects with wider right side of the face:

<table>
<thead>
<tr>
<th>No.</th>
<th>Wider left side</th>
<th>Left equal to right</th>
<th>Wider right side</th>
</tr>
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<tbody>
<tr>
<td>108</td>
<td>69</td>
<td>0</td>
<td>39</td>
</tr>
<tr>
<td>100%</td>
<td>63.8%</td>
<td>0%</td>
<td>36.1%</td>
</tr>
</tbody>
</table>

Table 5: The percentage of coincidence and non coincidence between menton and Fml:

<table>
<thead>
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<th>No.</th>
<th>Coincide with facial midline</th>
<th>Not coincide with facial midline</th>
<th>Shifts to left</th>
<th>Shifts to right</th>
</tr>
</thead>
<tbody>
<tr>
<td>108</td>
<td>22</td>
<td>87</td>
<td>47</td>
<td>40</td>
</tr>
<tr>
<td>100%</td>
<td>20.3%</td>
<td>80.5%</td>
<td>43.5%</td>
<td>37%</td>
</tr>
</tbody>
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