To Evaluate the Co-relation Between Distance of Supraorbital Notches and Interdental Distances

Rozina Vishnani¹, Siddharth Gosavi², Sulekha Gosavi³, Sneha Singh¹, Vimaxi Shah¹

ABSTRACT

Introduction: Earlier various studies were conducted on cadavers for mouth width prediction. This type of study has been first time conducted on living humans. The present study aimed to find the correlation between supraorbital notches and interdental distances using vernier caliper and thread measurement.

Material and methods: Distance between supraorbital notches (SON) was recorded using digital vernier caliper and readings were noted down and it is used as control group. Inter canine (IC), Inter 1st premolar (IP) and Inter 1st molar (IM) distances was recorded by placing the external jaws of vernier caliper (straight reading) on the distal aspect at middle third of the respective teeth. Similarly same parameters were recorded with thread (Curvilinear reading).

Result: In vernier caliper group moderate positive correlation between Supraorbital notch and Intercanine distance (r= 0.53, p=0.00) and Supraorbital notch and Inter 1st premolar distance. (r= 0.49, p=0.00). There was weak positive correlation between supraorbital notch and Inter 1st molar distance. (r= 0.33, p=0.00). In thread group a moderate positive correlation was found between Supraorbital notch and Intercanine distance. (r= 0.41, p=0.00). There is a weak positive correlation between Supraorbital notch and Inter 1st premolar distance. (r= 0.35, p=0.00). There is no correlation between Supraorbital notch and Inter 1st molar distance. (r= 0.15, p=0.14).

Conclusion: It can be concluded that the distance between supraorbital notches is statistically more significant to Intercanine distance and formulas can be used to calculate Intercanine width-SON distance = 1.80 + 0.63 IC distance with vernier caliper and SON distance = 1.97 + 0.46 IC distance with thread.

Keyword: Supraorbital notch, Intercanine, Inter 1st premolar, Inter 1st Molar, arch width

INTRODUCTION

Teeth are hardest mineralized structure in human body which plays important role in mastication, speech and aesthetics. Teeth also support labial and buccal musculature of face. Edentulism can cause loss of vertical dimension of face and decreased lip muscle tone, difficulty in speech and mastication, poor aesthetics, residual ridge resorption and collapse of facial musculature. Various methods are applied to estimate teeth size like pre-extraction records which include old photographs, radiographs, dental cast etc. and efforts are made by dentist to give as natural appearance with the help of artificial teeth. Proper shade selection, shape and size of teeth are necessary as per Sex, Personality and Age. Interdental arch width and arch length have been helpful in various studies for gender determination, anthropometric analysis and orthodontic treatment planning. Supraorbital notch is a groove or indentation in the orbital margin of the frontal bone, around the junction of the medial 1/3rd and lateral 2/3rd, through which supraorbital nerve and vessels passes. In some cases the ligament that bridges across the notch become ossifies converting the easily palpabal supraorbital notch into less easily palpabal supraorbital foramina. Webster et al mentioned that 25% individual notches are transformed into foramina by ossification of ligaments crossing it. Knowledge of variations of supraorbital foramen in maxillofacial surgery is helpful in providing meticulous approach and helps to facilitate the surgeon’s innervations. Even the anatomical variation of these regions has special considerations for ocuoplastic surgery. Earlier various studies were conducted on cadavers and excluded criteria.

How to cite this article: Rozina Vishnani, Siddharth Gosavi, Sulekha Gosavi, Sneha Singh, Vimaxi Shah. To evaluate the co-relation between supraorbital notches and interdental distances. International Journal of Contemporary Medical Research 2016;3(10):3052-3055.
Malaligned teeth (crowding/spacing), missing dentition due to caries, impacted or congenitally missing teeth and patients undergoing orthodontic treatment, decayed/restored proximal surfaces, attrition or abrasion in maxillary arch.

The study was conducted after obtaining ethical clearance from the ethical committee of KIMS DU. The procedure was explained to the patient and consent was obtained before proceeding. Supraorbital notch of right side was palpated bare handedly with left index finger. Marking was made using marking pencil. Similar procedure was repeated for left side. Distance between supraorbital notches was recorded using digital vernier caliper (aerospace) and readings was noted down and it is used as control group.

For intraoral measurements vernier caliper was disinfected using bacilol solution. With gloved hand Intercanine distance was recorded by placing the external jaws of vernier caliper on middle third of right canine and other end on distal aspect of left canine at middle third covering the Intercanine arch length. Marking was made on thread. Thread was then straightened and measurement was taken using external jaw of vernier caliper. Similar process was repeated for 1<sup>st</sup> premolar and 1<sup>st</sup> molar. Readings were noted down (Served as Group B).

**STATISTICAL ANALYSIS**

All the readings were noted and underwent for statistical analysis. Regression analysis and Chi square test were used to calculate the significance.

**RESULT**

**Group A: Distance measured using Vernier Caliper**

Statistically there was a moderate positive co-relation between Supraorbital notch and Intercanine distance \((r = 0.53, p = 0.00)\) and Supraorbital notch and Inter 1<sup>st</sup> premolar distance. \((r = 0.49, \ p = 0.00)\) and a weak positive co-relation between supraorbital notch and Inter 1<sup>st</sup> molar distance \((r = 0.33, \ p = 0.00)\).

**Group B: Distance measured using Thread**

Similar measurements were found between supraorbital notches and Intercanine distances measured using thread. A moderate positive co-relation was found between Supraorbital notch and Intercanine distance \((r = 0.41, \ p = 0.00)\) and a weak positive co-relation between Supraorbital notch and Inter 1<sup>st</sup> premolar distance \((r = 0.35, \ p = 0.00)\) However no co-relation between Supraorbital notch and Inter 1<sup>st</sup> molar distance \((r = 0.15, \ p = 0.14)\) was found. (Table 1 & 2)

**Regression analysis**

In Vernier Caliper group the regression analysis was as follow Regression Analysis: Intersupraorbital notch distance versus Intercanine, Inter 1<sup>st</sup> Premolar and Inter 1<sup>st</sup> Molar Distance measured with vernier caliper

**Table-1:** Showing mean and standard deviation of the control and study group.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Distance between Supraorbital notch (cm) (control)</th>
<th>Interdistal Distances measured using Vernier Caliper (cm) (Group A)</th>
<th>Interdistal Distances measured using Thread (cm) (Group B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std Dev</td>
<td>Minimum</td>
</tr>
<tr>
<td></td>
<td>4.31</td>
<td>0.50</td>
<td>3.04</td>
</tr>
<tr>
<td></td>
<td>0.40</td>
<td>0.42</td>
<td>3.16</td>
</tr>
<tr>
<td></td>
<td>4.66</td>
<td>0.47</td>
<td>3.04</td>
</tr>
<tr>
<td></td>
<td>5.40</td>
<td>0.43</td>
<td>4.09</td>
</tr>
<tr>
<td></td>
<td>5.04</td>
<td>0.44</td>
<td>4.12</td>
</tr>
<tr>
<td></td>
<td>6.08</td>
<td>0.59</td>
<td>4.24</td>
</tr>
<tr>
<td></td>
<td>10.20</td>
<td>0.35</td>
<td>9.15</td>
</tr>
</tbody>
</table>

**Table-2:** Showing co-relation between distance of supraorbital notches and interdental distances

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coefficient</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.40</td>
<td>2.49</td>
<td>0.01*</td>
</tr>
<tr>
<td>Intercanine distance</td>
<td>0.43</td>
<td>2.98</td>
<td>0.00*</td>
</tr>
<tr>
<td>Interpremolar distance</td>
<td>0.24</td>
<td>1.65</td>
<td>0.10</td>
</tr>
<tr>
<td>Intermolar distance</td>
<td>0.01</td>
<td>0.10</td>
<td>0.92</td>
</tr>
</tbody>
</table>

**Table-3:** Regression Analysis: Intersupraorbital notch distance versus Intercanine, Inter 1<sup>st</sup> Premolar and Inter 1<sup>st</sup> Molar Distance measured with vernier caliper

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coefficient</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.85</td>
<td>1.39</td>
<td>0.17</td>
</tr>
<tr>
<td>Intercanine distance</td>
<td>0.35</td>
<td>2.71</td>
<td>0.01*</td>
</tr>
<tr>
<td>Interpremolar distance</td>
<td>0.16</td>
<td>1.67</td>
<td>0.09</td>
</tr>
<tr>
<td>Intermolar distance</td>
<td>-0.02</td>
<td>-0.20</td>
<td>0.84</td>
</tr>
</tbody>
</table>

**Table-4:** Regression Analysis: Intersupraorbital notch distance versus Intercanine, Inter 1<sup>st</sup> Premolar and Inter 1<sup>st</sup> Molar distance with thread
The equation shows that the coefficient for Intercanine distance is 0.63 cm. The coefficient indicates that for every additional cm in Intercanine distance you can expect Intersupraorbital notch distance to increase by an average of 0.63 cm.

The regression equation is

$$\text{Intersupraorbital notch distance} = 1.80 + 0.63 \text{ Intercanine distance with vernier caliper}$$

For Thread the regression analysis is as follow

Regression Analysis: Intersupraorbital notch distance versus Intercanine, Inter 1st Premolar and Inter 1st Molar distance with thread (Table 4)

The coefficient with thread of Intercanine distance is 0.35 cm, for inter 1st premolar distance is 0.16cm and for inter 1st molar distance is -0.02cm

The regression equation is

$$\text{Intersupraorbital notch distance with Thread} = 1.85 + 0.35 \text{ Intercanine + 0.16 Inter 1st Premolar - 0.028 Inter 1st Molar.}$$

Regression Analysis: Intersupraorbital notch distance versus Intercanine Distance with thread

The regression equation is

$$\text{Intersupraorbital notch distance} = 1.97 + 0.46 \text{ Intercanine distance with thread}$$

The equation shows that the coefficient for Intercanine distance is 0.46 cm. The coefficient indicates that for every additional cm in Intercanine distance you can expect Intersupraorbital notch distance to increase by an average of 0.46 cm.

DISCUSSION

Relation between the various fixed anatomical landmarks can be helpful in various clinical medical and dental fields. Earlier various studies have been conducted on dry skulls, Cadavers, photographic and radiographic studies which aimed to find the relationship between various anatomical landmarks.

Stephen and Henneberg (2003) conducted a study on predicting mouth width from Inter-canine width – A 75% Rule. Photographs of 93 participants in smiling and relaxed poses were measured for distance between the most lateral aspects of the canines and the width of the mouth (cheilion to cheilion). Overall, inter-canine width averaged 39.5 mm, and mouth width averaged 52.5 mm. Intercanine width was therefore equivalent to 75.8% of mouth width (or mouth width was about 133% of canine width).

In the present study average Intercanine width was 40 mm with vernier caliper and that of thread is 50.4 mm.

In 2008, Stephen and Murphy conducted a study on 9 cadavers; mean mouth width for all the cadavers was found to be 55.1mm, SD 4.4mm. The mean width between the lateral aspects of the canines as measured in three individuals was 40.8mm. The canine width symbolized 72% of the mouth width approximating the 75% rule reported by Stephan and Henneberg. The error producing from use of the 75% rule was -2.4mm for the three individuals for whom mouth width and canine width could be measured.

In 2013, Swaminathan S et al determined the morphology and morphometric distance of supraorbital foramen/ notch(SOF/N) and infrorbital foramen(IOF) from different important anatomical landmark he found that the mean width of SOF/N and IOF was 2.86mm and 3.85 respectively. The mean distance of SOF/N was 25.9 mm lateral to nasion, 28.5 mm medial to temporal crest of the frontal bone, 0.92 mm superior to supraorbital rim. The distance between right and left SOF/N was 49.6 mm.

In 2016, Jaiswal sonia et al. conducted a study on the anatomy of supraorbital notch and foramen and its clinical co-relations on one hundred dry human skulls of unknown age and gender.

Notches were found to be greater in number (43.8%), followed by foramen (17.7%) and depressions were found to be (13.5%). Certain combinations were found out of which the combination of foramen and notch was the highest (21.9%), notch and depression was (2.1%) while presence of a depression and foramen was (1%)

The present study has been conducted on humans in order to find the relationship between the distance between supraorbital notches and dental parameters like Intercanine distance, inter 1st premolar distance and inter 1st molar distance. We have made an effort to derive a formula which can be helpful in selection of size of teeth in completely or partially edentulous patients.

Out of all three dental parameter, Intercanine width with vernier caliper and thread has been found closest to the distance between supraorbital notches. In the absence of pre-extraction records co-relation between distance of supraorbital notches and Intercanine distance can be helpful to determine the size of teeth.

CONCLUSION

It can be concluded that the distance between supraorbital notches is statistically more significant to Intercanine distance. Following formulas can be used to calculate Intercanine width-

$$\text{Intersupraorbital notch distance} = 1.80 + 0.63 \text{ Intercanine distance with vernier caliper}$$

$$\text{Intersupraorbital notch distance} = 1.97 + 0.46 \text{ Intercanine distance with thread}$$

REFERENCES

8. Stephen C.N, Murphy S.J. Mouth width prediction in craniofacial identification: cadaver tests of four recent


Source of Support: Nil; Conflict of Interest: None
Submitted: 19-09-2016; Published online: 28-10-2016