



## EVALUATION OF THE CO-RELATION BETWEEN THE VERTICAL DIMENSION OF OCCLUSION AND THE LENGTH OF THE RIGHT-HAND PALM- AN ANTHROPOMETRIC STUDY

### Dental Science

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### ABSTRACT

**CONTEXT:** The accurate determination of vertical jaw relation is extremely important for successfully achieving comfort, function and esthetics for an edentulous patient.

**AIM:** The aim of this study was to find a correlation between vertical dimension of occlusion (VDO) and length of right hand palm.

**METHODS AND MATERIAL:** The study was conducted on 60 dentate subjects (30 Males and 30 Females) who fulfilled the inclusion criteria. Anthropometric measurements of vertical dimension of occlusion and length of right hand palm were recorded. Correlation between VDO and length of right hand palm was studied using Pearson's correlation test and unpaired t test used to find correlation among males and females VDO & right palm.

**RESULTS:** Pearson's correlation test showed that VDO in both males ( $r=0.8001$ ,  $p\text{ value}=0.000$ ) and females ( $r=0.9556$ ,  $p\text{ value}=0.000$ ) has strong coefficient correlation with the length of right hand palm. The study also suggested by unpaired t test that there is no statistical correlation between the males and females VDO ( $t=-0.3366$ ,  $p\text{ value}=0.7377$ ) and length of right palm ( $t=-0.1046$ ,  $p\text{ value}=0.9170$ )

**CONCLUSIONS:** Within the limitations of this study, it was concluded that for males and female subjects VDO and length of right hand palm was highly correlated and this anthropometric measurement can be used to determine VDO in edentulous patient.

### KEYWORDS

Vertical Dimension of Occlusion, Length of palm, Vernier caliper

### INTRODUCTION:

One of the important step in complete denture construction is determining the correct vertical dimension of occlusion. On an established VDO, centric relation is recorded. Failure to record VDO accurately can lead a negative effect from both functional and esthetic point of view and even make the denture unwearable. Many Pre-extraction and post extraction methods have been proposed to determine the VDO<sup>1,2,3</sup>.

Though pre-extraction records are valuable for restoring the VDO, but they may not be available always. Other methods like use of Boos biometer<sup>4</sup>, Cephalometric method<sup>5</sup>, electro-myographic method<sup>6</sup> urges for complicated equipment. Few other methods like determining physiologic rest position, swallowing method, phonetics, esthetic appearance is completely subjective methods which can vary among different observers.<sup>7,8,9</sup>

None of mentioned methods are precise and prefect. Despite of advancements and innovations in Prosthetic Dentistry, consensus remains to be reached on how to accurately establish the VDO. Many authors used various craniometric and anthropometric measurement methods to correlate with VDO like interpupillary distance, distance between ear-eye to chin-nose, length of little & middle finger.<sup>10,11,12</sup>

If a correlation is found between the VDO and certain parameters which are accessible and static it can be used to evolve a precise and objective method for determining VDO for an individual. The aim of this study is to find a correlation between VDO and length of the right palm and thus this objective method can be used by an undergraduate student to determine VDO for an edentulous patient.

### SUBJECTS AND METHODS:

The study was conducted in College of Dentistry, Al Jouf University, Sakaka, KSA on 60 dentate subjects (30 males and 30 females) in the age group of 20-31 years, who were healthy and have occlusal harmony (class I) and no deformity of palm and fingers of right hand. The exclusion criteria were facial disfigurement, missing and attrited

teeth, orthodontic treatment, temporomandibular joint disorder or history of trauma. Informed consent was taken by all the subjects. The anthropometric measurements of vertical dimension of occlusion and length of right hand palm was recorded using digital vernier caliper (Fig.1) with an accuracy of  $\pm 0.001\text{mm}$ .



**Figure 1. Digital Vernier Caliper**

The subjects were asked to sit on dental chair with proper head and back support. To measure the vertical dimension of occlusion, the subject was asked to lightly bite on the posterior teeth in occlusion and using the caliper the VDO was measured between prominent point of the hair line on the forehead and base of chin (Fig.2).



**Figure 2. VDO measured between prominent point of the hair line on the forehead and base of chin**

For the length of right hand, the subjects were asked to keep his/her right hand on the flat surface of the table. The length of hand was measured from first crease on the base of right hand to tip of the middle finger (Fig.3).



**Figure 3. Length of hand measured from first crease on the base of right hand to tip of the middle finger**

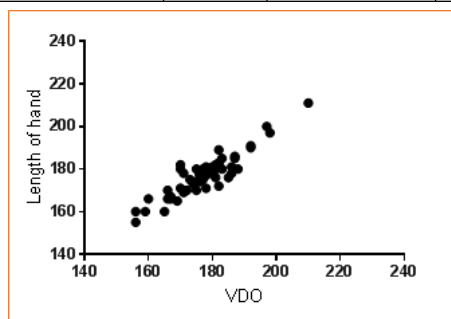
All the measurements taken were recorded in tabular form. For the parameters of the study mean, SD and range was calculated. Statistical analysis was done using Pearson's correlation and unpaired t test.

### RESULTS:

The Pearson's correlation test for VDO and length of right palm showed a value of 0.8001, P-value=000 for males and for females it showed a value of 0.913, P-value=000. The combined correlation (N=60) showed Correlation value=0.508, P Value=000 (Table 1 & Graph 1).

**Table 1. Pearson's correlation descriptive statistics for VDO and length of right palm**

| Parameters                      | Mean±SD    | Pearson's Co-relation (N=60) |         |
|---------------------------------|------------|------------------------------|---------|
|                                 |            | Correlation value            | P value |
| Vertical Dimension of occlusion | 177.26±3.8 | 0.508                        | 0.000   |
| Length of right Hand palm       | 176.86±3.7 |                              |         |



**Graph 1. Graph showing significant correlation between VDO and length of right palm (N=60)**

The mean value for VDO, in males, was 176.8mm with standard deviation of 3.84mm. The mean value for length of right hand palm 176.7mm with standard deviation 3.72mm. The mean value for VDO in females was 177.7mm and mean value for Length of right palm was 177mm. The t value for VDO and length of right palm was -0.336 and -0.105 respectively (Table 2 & 3). Hence it revealed that there is no statistical significance correlation between males and females VDO and length of right palm.

**Table 2. Description of unpaired t test for equality of means of VDO in males and females**

| Subjects | N  | Measurements (in mm)            | Mean ± SEM    | t value | Sig (2-tailed) |
|----------|----|---------------------------------|---------------|---------|----------------|
| Males    | 30 | Vertical Dimension of Occlusion | 176.8 ± 1.39  | -0.3366 | 0.738          |
| Females  | 30 |                                 | 177.7 ± 2.168 |         |                |

**Table 3. Description of unpaired t test for equality of means of Length of right palm in males and females**

| Subjects | N  | Measurements (in mm)      | Mean ± SEM   | t value | Sig (2-tailed) |
|----------|----|---------------------------|--------------|---------|----------------|
| Males    | 30 | Length of right hand palm | 176.7 ± 1.43 | -0.105  | 0.917          |
| Females  | 30 |                           | 177 ± 2.11   |         |                |

### DISCUSSION:

The focus of Prosthodontics has shifted from removable prosthesis to fixed prosthesis and now implant are riding high, but still the concept of jaw relation remains a very important bottom-line aspect for providing foundation for removable, fixed and implant prosthetic rehabilitation. Vertical dimension is determined by 1. the teeth in maximum intercuspation (VDO) and 2. the lower jaw at rest position (VDR). In edentulous patients the VDO is important because on an established VDO the centric relation is recorded. If the VDO is recorded too high or too low, it would end up deteriorating the patient's condition. There are variety of techniques for determining VDO which are either tedious, require clinical judgment, time consuming, require special equipment or instrument or exposes patients to radiations.

Many authors correlated VDO with various anthropometric measurements. Since ages anthropometric measurements were used to determine proportions of body parts through golden proportion. Hence the study was designed to find a correlation between vertical dimension of occlusion and length of right palm so that it can be used as an objective, simple and precise method by an undergraduate student to determine the VDO who lacks clinical judgement.

Based on the selected subjects and statistical analysis, this study suggested no correlation between the males and females VDO and length of right palm. The P-value was 0.738 and 0.917 for VDO and length of right palm respectively for males and females. This finding was in accordance with Jackson's<sup>13</sup> prediction, who suggested in his study that there is significant sexual difference in anthropometric measurements in males and females due growth difference. However, there was no published report regarding the co-relation between VDO and length of right hand palm and the study suggest a statistical correlation between VDO and length of right hand palm. Hence, the study revealed that length of right palm can be used as simple, objective and predictable means for determining vertical dimension of occlusion for an edentulous patient. The limitation of the study was that it was restricted to subjects with class I occlusal harmony and right hand palm.

### CONCLUSION:

Within the limitations of this study it can be concluded that Vertical dimension of occlusion and length of right hand palm were almost equal (within the range 0-4mm) and hence can be used to determine vertical dimension of occlusion in male and female edentulous patients.

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