

AN ANTHROPOMETRIC CORRELATION BETWEEN THE VERTICAL DIMENSION OF OCCLUSION AND LENGTH OF THE RIGHT RING FINGER OF THE DENTATE PATIENTS VISITING A TERTIARY CARE HOSPITAL

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ABSTRACT

OBJECTIVE: To find anthropometric correlation between the vertical dimensions of occlusion (VDO) and length of the right ring finger (RRFL) of dentate patients visiting a tertiary care hospital for crowning the root canal treated tooth.

METHODOLOGY: The study being done was cross sectional. The study area was carried out in the Outpatient department of Department of Prosthodontics, Bacha Khan College of Dentistry Mardan, KPK from August 2019 to Feb 2020. Each participant sat on a dental chair with their heads up, VDO was recorded with a digital Vernier scale. The recording of RRFL, which was made on the aforesaid finger from the tip to the furthest point on the palmar digital crease, acted as the second measurement. The measured lengths i.e. VDO and the RRFL were transferred to the data collection form along with other parameters like age, gender, address and reason for visit to study whether any correlation exists between the VDO and RRFL or not.

RESULTS: Correlation of VDO and RRFL with respect to age in 18-25 years age group was, $r = 0.4057$ and p Value 0.000336 . In 26-30 years age group, $r = 0.2549$ and p value: 0.028398 . Correlation of VDO and RRFL with respect to gender in male group was, $r = 0.3465$ and p Value = 0.002493 . In the female group, $r = 0.2763$ and p Value = 0.01717 .

CONCLUSION: RRFL has a positive correlation with VDO and maybe useful in determination of VDO. It is however recommended that this reference point should be used along with other measurements for proper VDO selection.

KEY WORDS: Right Ring Finger Length, Prosthodontics, Vertical Dimension of Occlusion

INTRODUCTION

The absence of natural teeth is referred to as “edentulism”¹. It can lead to many problems² among which are the difficulties in performing different functions e.g. mastication³, speech⁴ and biting⁵, loss of esthetics⁶ and some adverse psychological effects⁷. One of the major consequences of edentulism is the loss of vertical dimensions of occlusion (VDO)⁸ which is defined as the distance between the two selected anatomic points (usually one on the tip of the

nose and other on the chin)¹. Measuring and restoring the VDO accurately is very important if the maximum functions and esthetics are to be achieved during the prosthodontic treatment of the edentulous patients⁹. Failure of the complete denture therapy can occur if the VDO is not recorded precisely¹⁰.

During total denture therapy, prosthodontists have historically grappled with how to measure the VDO¹¹. Several strategies have been provided for measuring the VDO, including the use of interocclusal rest locations¹⁵, cephalometry¹³, and pre extraction recordings¹². Many other techniques, such as the swallowing technique¹⁶, phonetics¹⁷, and aesthetics¹⁸. McGee¹⁹ and many other authors²⁰⁻²² have used anthropometric values such as length of nose, length of one eye, interpupillary distance,

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distance between hairline and eyebrow line and eyerima oris distance to correlate with the VDO. Some authors²³⁻²⁶ have used the length of the thumb and little finger to correlate it with VDO. Unluckily there is no particular universally acceptable method for measuring the VDO^{22,26}.

In order to determine the VDO during prosthodontic treatment for edentulous patients using the same measurements taken from dentate participants, the right ring finger's length (RRFL) was measured in this study.

MATERIALS AND METHODS

The Department of Prosthodontics conducted a descriptive cross-sectional study, Bacha Khan College of Dentistry Mardan from 26th August 2019 to 25th Feb 2020. Sample size was 74 selected by using Non-Probability, consecutive sampling. Approval was sought from institutional ethical committee. Subjects fulfilling the inclusion were included in the study. The purpose, procedures, risks and benefits of the study were explained to them and informed consent was obtained.

A. INCLUSION CRITERIA

1. Patients aging 18-30 years visiting for crowning the root canal treated tooth.
2. Angle Class I relationship.
3. Patients having definite occlusal stop in centric relationship.
4. Patients having at least 28 teeth in their mouth.
5. Individuals from both genders were included in the study.

B. EXCLUSION CRITERIA

1. Patients who had undergone orthodontic treatment.
2. Patients having fractures or surgery of any jaw.
3. Patients having tooth wear or deformities like oligodontia or any tooth size discrepancy.
4. Patients having RRFL or absence.

Each participant sat on a dentist chair with their head held high. The subject was instructed to hold until the measurement of VDO was recorded with a digital vernier calliper and to maintain as tight of a bite as feasible (Fig. 1). The mid-symphysis region was measured from the point marked at the base of the nose to the point marked at the base of the chin while the teeth were in their maximum intercuspation. (Fig.2) Using the same measurement instrument as before, the second measurement was the recording of the RRFL, which was done on the aforementioned finger from the tip to the furthest point on the palmar digital crease (Fig.3). Two FCPS trainers who had previously calibrated for the measurements took each measurement. Final length was calculated as the average of two measurements. Together with other details like age, gender, residence, and reason for visit, the measured lengths—the VDO and the RRFL—were included to the data collecting form.

DATA ANALYSIS

The data was analyzed using SPSS version 20 software program in Microsoft Windows 8.1. Mean and standard deviation were calculated for quantitative variables e.g. age, VDO and the RRFL. Qualitative variables such as gender were calculated as frequency and percentages. Pearson's correlation test was applied to see the correlation between the VDO and RRFL. Effect modifiers like age and gender were addressed through stratification. Pearson's "r" was stratified by effect modifiers. Post-stratification "p value" was calculated and the value of "p ≤ 0.05" was taken as significant.

RESULTS

35 (44.87%) patients were recorded in 18-25 years age group 39 (52.70%) patients were recorded in 26-30 years age group (Table No. 1). 42 (56.75%) patients were male and 32 (43.25%) patients were female patients (Table No. 2). Mean and SDs for age was 24±3.28. Mean and SDs for VDO was 52±2.96. Mean and SDs for RRFL was 53±3.53. Overall Pearson Correlation Coefficient and p value for VDO and RRFL were r = 0.2962 and p Value = 0.010395 respectively. Correlation of VDO and RRFL with respect to age in 18-25 years age group was r = 0.4057 and p value= 0.000336. In 26-30 years age group, r = 0.2549 and p value: 0.028398 (Table No. 4). Correlation of VDO and RRFL with respect to gender in

male group was $r = 0.3465$ and p Value= 0.002493. In the female group, results were $r = 0.2763$ and p Value= 0.01717 (Table No. 5).

Table 1: Age Distribution

| Age Group | Frequency | Percentage |
|-------------|-----------|------------|
| 18-25 Years | 35 | 44.87% |
| 26-30 Years | 39 | 52.70% |
| Total | 74 | 100% |

Table 2: Gender Distribution

| Gender | Frequency | Percentage |
|--------|-----------|------------|
| Male | 42 | 56.75% |
| Female | 32 | 43.25% |
| Total | 74 | 100% |

Table 3: Descriptive Statistics

| Numerical Variables | Mean | SDs |
|---------------------|------|------|
| Age | 24 | 3.28 |
| VDO | 52 | 2.96 |
| RRFL | 53 | 3.53 |

Overall results for VDO and RRFL:

$r = 0.2962$

p Value= 0.010395

Table 5: Correlation of VDO and RRFL with Respect to Gender

| Gender Groups | Mean & SDs | | P Value | Pearson Correlation Coefficient |
|---------------|------------|---------|----------|---------------------------------|
| | VDO | RRFL | | |
| Male | 52+3.84 | 53+3.62 | 0.002493 | $r = 0.3465$ |
| Female | 52+0.94 | 53+3.46 | 0.01717 | $r = 0.2763$ |

Table 4: Correlation of VDO and RRFL with respect to age

| Age Groups | Mean & SDs | | P Value | Pearson Correlation Coefficient |
|---------------|------------|---------|----------|---------------------------------|
| | VDO | RRFL | | |
| 18 - 25 Years | 52+0.75 | 52+2.73 | 0.000336 | $r = 0.4057$ |
| 26 - 30 Years | 53+3.94 | 54+3.86 | 0.028398 | $r = 0.2549$ |

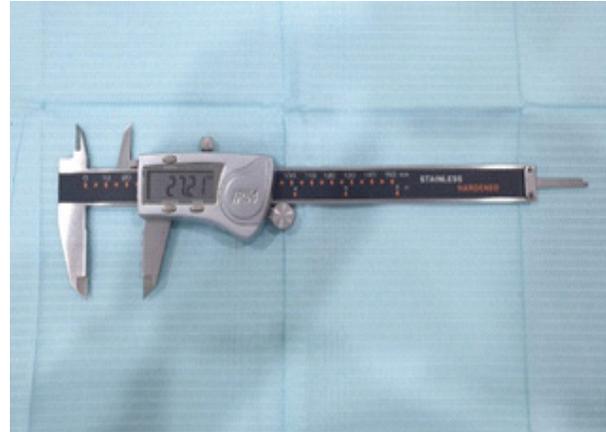


Figure 1: Digital Vernier Calliper



Figure 2: Measurement of VDO



Figure 2: Measurement of RRFL

DISCUSSION

In our study, 35 (44.87%) patients were recorded in 18-25 years age group 39 (52.70%) patients were recorded in 26-30 years age group (Table No. 1). 42 (56.75%) patients were male and 32 (43.25%) patients were female patients (Table No. 2). Mean and SDs for age was 24 ± 3.28 . Mean and SDs for VDO was 52 ± 2.96 . Mean and SDs for RRFL was 53 ± 3.53 . Overall Pearson Correlation Coefficient and p value for VDO and RRFL were 0.2962 and 0.010395 respectively. Correlation of VDO and RRFL with respect to age in 18-25 years age group was $r = 0.4057$ and p value = 0.000336. In 26-30 years age group results were $r = 0.2549$ and P value = 0.028398 (Table No. 4). Correlation of VDO and RRFL with respect to gender in male group was, $r = 0.3465$ and p Value = 0.002493. In the female group, $r = 0.2763$ and p Value = 0.01717 (Table No. 5).

The way Niswonger plays has an impact from a range of factors. According to McGee, techniques that rely on how the patient senses the occlusal vertical dimension can shrink the vertical dimension since the patient feels more at comfort there. In order to determine the vertical dimension in patients who would soon be edentulous, Silverman¹⁷ devised a way that included tattooing the mucosa near the teeth which will be excised. Smith suggested using Boos' bimeter method to measure the vertical dimension.

The patient must employ his or her power of closure, which can be influenced by pain and emotional condition, which is one of the numerous disadvantages of the bimeter approach. In attrition scenarios and when natural tooth connections are lost, clinical observations show that VDO changes in natural teeth, making it challenging to exactly estimate the patient's vertical dimension.

The most reliable techniques, according to the current agreement, incorporate aesthetic assessment and pre-extraction records procedures like measuring the vertical and horizontal overlap of natural anterior

teeth. With no such records, it is hard to figure out a mandibular starting position from which to reassemble the occlusal vertical dimension.

In order to overcome these challenges and account for the shortcomings of previously employed methods, this study set out to find a method that has the properties of simplicity and practicality for both the dentist and the patient. In light of the fact that bodily components grow in accordance to one another, the relationship between VDO and RRFL was associated in this study. Gender dimorphism was found in this study, and it was shown that men had longer fingers and greater VDO levels than women. The amount of androgen exposure throughout puberty is the reason of these variances in finger length. The results demonstrated that this method of determining VDO by RRFL measurement becomes a simple and fundamental guide.

Also, this technique delivers greater prosthetic benefits and demands less guesswork because it is more objective than subjective. This method's VDO estimation error is within the range of 2-4 mm compared to other approaches, which create errors in the range of 0-14 mm. Variations in ethnicity, sample size, or measurement methodology may be the cause of the minute variability reported during measurement recording in the procedure. This study methodology is appealing and practical since it is easy to use, inexpensive, non-invasive, reliable, doesn't require radiography or complicated measuring equipment, takes less time, and produces repeatable values for further usage.

The only variable the study may evaluate was RRFL. While this study of correlation only looked at the length of the RRFL and occlusal vertical dimension of occlusion, more studies are needed on the method by including and investigating correlation with both the occlusal vertical dimension and rest vertical dimension.

CONCLUSION

While it was established that the measurement of the right ring finger is substantially equivalent to the vertical dimension of occlusion (VDO), the authors advise using this method in conjunction with other observations to arrive at the final VDO.

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