

Correlation of Vertical Dimension at Occlusion with Length of Thumb and Index Finger in Edentulous Patients

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ABSTRACT

Vertical dimension at occlusion (VDO) is the distance between two selected anatomic point usually on the tip of nose and the chin, which is measured by using Niswonger's method in edentulous patient. Freeway space is the distance between occluding surfaces of upper and lower teeth when the mandible is in physiologic rest position. This study was carried out to find correlation between VDO measured by Niswonger's method and length of index fingers measured by vernier caliper and to find correlation between VDO measured by Niswonger's method and the length of thumb measured by vernier caliper

Key words- Vertical dimension at occlusion, Niswonger's method, length of index fingers.

INTRODUCTION

Recording correct occlusal vertical dimension is very important in complete denture. Frequently difficulties are encountered in determination of correct VDO. Many methods have been proposed to determine VDO that includes recording vertical dimension at rest (VDR) and the free way space to calculate exact vertical dimension at occlusion (Niswonger's method). Hence this study will be done to determine correlation between VDO and the length of index finger and thumb which will help to support the value of VDO calculated by Niswonger's method.

Vertical dimension at occlusion (VDO) is the distance between two selected anatomic point usually on the tip of nose and the chin, which is measured by using Niswonger's method in edentulous patient.

$VDO = VDR - \text{Freeway space}$

Freeway space is the distance between occluding surfaces of upper and lower teeth when the mandible is in physiologic rest position.

Importance of freeway space-

- Relaxation of masticatory apparatus.
- No strain on temporomendibular joint capsule.
- Minimal activity in elevator and depressing muscles.
- Essential for health of periodontal tissues when natural teeth are present.

Reduction of freeway space results in-

- Excessive loading of denture bearing tissues.
- Elevator muscles are unable to return to their normal resting position.

- Continuous muscular activity results in pain.
- Increasing of freeway space results in-
- Reduction of masticatory efficiency.
- Poor facial appearance and cheek biting.

Objectives-

- To find correlation between VDO measured by Niswonger’s method and length of index fingers measured by vernier caliper.
- To find correlation between VDO measured by Niswonger’s method and the length of thumb measured by vernier caliper.

MATERIALS AND METHODS

Study setting - A cross sectional study will be carried out on 40 edentulous patients.

Study population-, patients registered in daily OPD in the Department of Prosthodontics, V.S.P.M dental college and research centre, Nagpur.

Sampling size and justification- 40 edentulous patients will be selected from the daily OPD on the following exclusion and inclusion criteria-

- Patients coming for replacement of teeth will be included.
- Patients not willing to co-operate will be excluded.
- Patients having any disorder related to growth hormone are also excluded.

Sampling procedure- Patients will be selected by random sampling method from edentulous patients registered in daily OPD.

Measurements- History of the patients will be recorded and length of index finger and thumb of each patient will be measured using digital vernier caliper. The length of thumb and index finger will be measured on the palmer aspect from the tip of finger to the farthest point on palmer digital crease. VDO will be recorded by using Niswonger’s method. The data collected will be analyzed using SPSS software.

Data collection method-

Serial no.	Name of Patient	VDR (by Niswonger’s method)	VDO (by Niswonger’s method)	Right hand		Left hand	
				Right Index finger length	Right Thumb length	Left Index finger length	Left Thumb length

*VDR= vertical dimension at rest, VDO= vertical dimension at occlusion.

RESULT

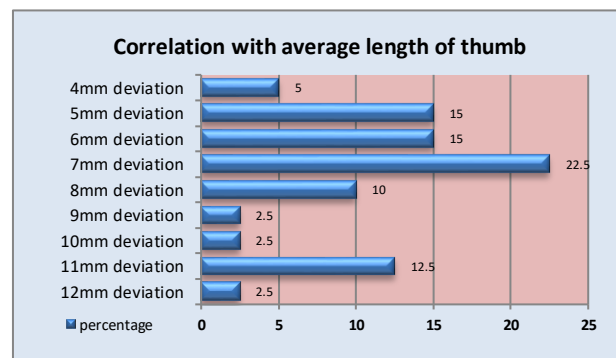
When VDO was compared to average length of index finger, the maximum deviation of 4 mm was found with 40% of patients and 60% of patients are found with deviation less than 4 mm.

When VDO was compared to average length of thumb, the maximum deviation of 12 mm is found with 2.5 % of patients and 98.5 % patients have deviation less than 12 mm.

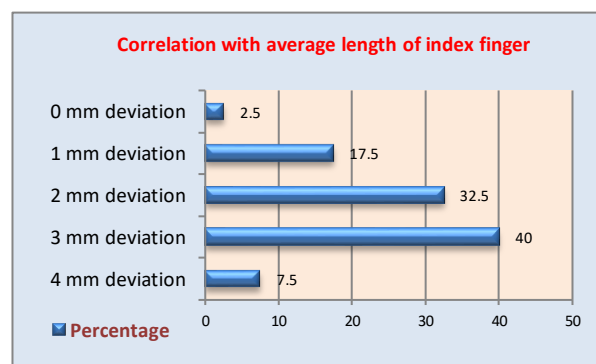
When comparisons were done, there was more correlation was found between Vertical Dimension at Occlusion (VDO) and average length of index finger, which was statistically significant.

Hence anthropometric measurement of average length of index finger is found as adjunct to record vertical dimension at occlusion (VDO).

Correlation with average length of thumb	Percentage
12mm deviation	2.5
11mm deviation	12.5
10mm deviation	2.5
9mm deviation	2.5
8mm deviation	10
7mm deviation	22.5
6mm deviation	15
5mm deviation	15
4mm deviation	5



Correlation with average length of index finger	Percentage
4 mm deviation	7.5
3 mm deviation	40
2 mm deviation	32.5
1 mm deviation	17.5
0 mm deviation	2.5



DISCUSSION

There are several thoughts and evidences regarding restoration of the correct OVD. These include the use of anterior teeth measurements,²¹ closest speaking space,⁶ swallowing method,²² patient's neuromuscular perception,²³ cephalometric radiographs,^{24,25} intraoral and extraoral anatomic landmarks,²⁶ and measurement of fingers.²⁷ All of these methods inherently possess some kinds of disadvantages. Some have errors in measurement, while others are prone to difficult application, higher cost, or longer time for application. Any variation in determining OVD can be detrimental to the aesthetics of facial soft tissues, induce speech difficulties, and cause temporo mandibular joint discomfort.

Pre-extraction record is undoubtedly superior to these methods.⁵ But recording the OVD of all patients and keeping it for future use is not always possible. In the absence of pre-extraction records, knowledge of aesthetics,

relationship of teeth to the ridges, measurements relative to the lip length, and use of phonetics and other methods are employed.

This study evaluated the relationship between the OVD and the length of the thumb and index finger, taking into account that the body parts grow proportionately. This study showed the relationship between VDO and index finger was better with least deviation, in a study carried out by *Laddha et. al.*, also found the strong correlation between VDO and length of index finger.

In present study when VDO was correlated with length of index finger maximum deviation of 4 mm was found in 40 % individuals. And when VDO was correlated with length of thumb, 98.5 % patients have deviation less than 12 mm. whereas in a study carried out by *Bajracharya et. al.* and *Basnet et. al.*, a significant correlation was found between VDO and length of thumb

This study has shown a correlation between VDO and length of index finger is better with least deviation as compared with the length of thumb.

CONCLUSION

The relationship between the OVD and the length of the thumb and index finger, taking into account that the body parts grow proportionately. This study showed the relationship between VDO and index finger was better with least deviation, Anthropometric measurement of average length of index finger is found as adjunct to record vertical dimension at occlusion (VDO).

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