ejpmr, 2018,5(6), 628-630

SJIF Impact Factor 4.897

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

SIGNIFICANCE BETWEEN VERTICAL DIMENSION OF OCCLUSION AND FINGER LENGTH IN NORTH INDIAN POPULATION

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Article Received on 10/04/2018 **Article Revised on 01/05/2018** **Article Accepted on 21/05/2018**

ABSTRACT

Introduction: Precise measurement of vertical dimension of occlusion (VDO) is primary consideration to a dentist especially a Prosthodontist. Though there are many methods that have been proposed in recording VDO but none of them fulfills the criteria of precision, reproducibility and ease. This study employs the use of length of fingers to measure VDO in North Indian population. **Materials and Methods:** The study was conducted on 100 dentulous subjects including 50 males and 50 females in the age range of 18 to 25 years. Measurement of VDO and length of fingers was recorded using a digital vernier caliper. Correlation between VDO and length of fingers was studied using Spearman's coefficient. **Result:** Vertical dimension of occlusion was found to be almost the length of index finger in males and little finger in females in North Indian population. **Conclusion:** The study revealed that length of index finger is almost equal to VDO in males and length of little finger is almost equal to VDO in females.

KEYWORDS: Anthropometric Measurement, Centric Occlusion, Vertical Dimension of Occlusion.

INTRODUCTION

According to glossary of prosthodontic terms 8th edition Glossary of prosthodontic terms (GPT 8), vertical dimension is defined as the distance between two selected anatomic and marked points (usually one on tip of nose and another upon the chin) one on a fixed and one on the movable member.[1] The accuracy of recording vertical dimension in occlusion (VDO) in edentulous patients is always a prime consideration for any dentist. Many methods have been proposed to determine VDO that include measuring vertical dimension at rest,[2] phonetic method,[3] cephalometric radiographs,[4] pre- extraction records.[5]

However, there is no accurate method of recording VDO. It is the responsibility of dentist to establish an appropriate lower facial height when it is lost in completely edentulous patients. A decrease in VDO does not allow the muscles of mastication to function at their normal length with adequate force, resulting in reduction of their efficacy, premature wrinkles, deep nasolabial furrows and folds at the angles of mouth leading to salivary retention causing angular cheilitis. If VDO is increased interocclusal rest space will be decreased leading to discomfort, incomplete muscle contraction, unaesthetic appearance, clicking of teeth and resorption of ridge. Nowadays newer methods are being proposed for recording VDO. One of the easiest and reproducible method is recording VDO by comparison with finger lengths of an individual. The purpose of this study is to study correlation between VDO and finger length in North Indian population.

MATERIALS and METHODS

This study was conducted on 100 dentate subjects (50 males and 50 females) in the age range of 18 to 25 years; subjects were selected randomly from Dr. Ziauddin Ahmad Dental College, A.M.U., Aligarh. Clearance from Institutional Ethical Committee was obtained. All subjects gave written consent. Anthropometric measurements of VDO and length of fingers of right hand were recorded using digital vernier caliper with an accuracy of ± 0.01 mm.

Subjects included had Angles class 1 molar relation, periodontally sound teeth in both upper and lower jaws and no deformity of fingers. Subjects with open bite and deep bite, missing teeth, attrition, restorations in the oral cavity, temporomandibular joint disorders, history of trauma, orthodontic treatment were excluded.

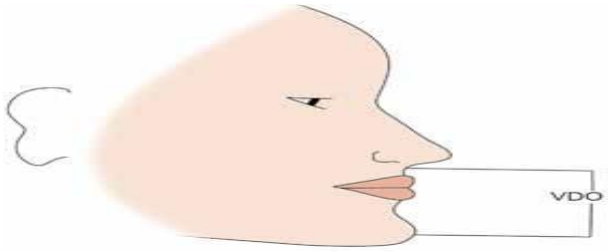

Fig. 1: Measurement of VDO using base of nasal septum and pogonion as reference points.

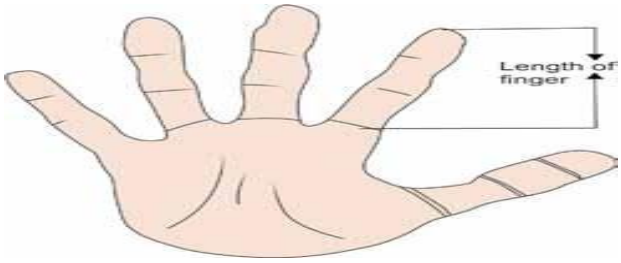

Fig. 2: Measurement of length of finger using tip of finger and the farthest point on palmar digital crease as reference points.

***Method*:** To record VDO, subjects were instructed to bite lightly on the posterior teeth in centric occlusion. The lower tip of the caliper was then placed firmly below the chin at pogonion. The upper tip of the caliper was then raised until it lightly touched the base of nasal septum (Fig. 1). Length of fingers was measured on palmar aspect from tip of finger to the farther most point on palmar digital crease (Fig. 2). For all the parameters of study mean, standard deviation and range was calculated. Correlation was studied using Spearman's rank correlation coefficient method.

RESULTS

The coefficient of correlation(r) by Spearman's method between the measured variables and VDO, at the prob- ability level of 95% is presented in Table 1. From Table 1, it was observed that in males and females VDO is significantly and positively correlated with all the parameters studied. In males correlation of VDO was strongest for the parameter length of index finger (r – 0.803). In females, correlation of VDO was strongest for the parameter length of little finger (r –0.901).

Table. 1: Sex specific correlation between VDO and length of fingers.

Fingers		***VDO***	
		Males	***Females***
Index	r-value	0.803	0.074
	p-value	0.001	0.701
Middle	r-value	0.364	0.156
	p-value	0.046	0.411
Ring	r-value	0.320	0.031
	p-value	0.084	0.875
Little	r-value	0.567	0.901
	p-value	0.002	0.019
Thumb	r-value	0.538	0.130
	p-value	0.001	0.506

Descriptive statistics of the parameters studied is presented in Table 2. From Table 2, it was observed that in males the mean value of VDO was 73.400 mm with a range from 64 to 79 mm whereas in females, the mean value was 64.900 mm with the range from 54 to 75 mm. Thus, VDO was more in males compared to females.

Table. 2: Descriptive statistics of VDO, length of little finger and index finger.

Sex	**Number**	**Measurement**	**Minimum (in mm)**	**Maximum (in mm)**	**Mean**	**Standard deviation**
Male	50	VDO	64	79	73.400	4.230
		Index	63	74	69.993	2.865
Female	50	VDO	54	75	64.900	4.357
		Little	51	63	59.357	3.589

The p-value for index finger in males came out to be 0.001 (highly significant) and the p-value for little finger in females came out to be 0.019 (highly significant).

DISCUSSION

Many investigators have suggested various methods for determination of VDO. Niswonger suggested 4⁄32 inch interocclusal space as a guide to determine the VDO. But variations have been reported.[6] Short-term variations occur in times of stress, respiration and head movements, whereas long-term variations occur in debilitated patients, mouth breathers and as a result of attrition. McGee found that methods which relied upon patients perception tend to register a reduced vertical dimension of occlusion because patients felt more comfortable in that position.[7] Silverman placed tattoos on alveolar ridges prior to the removal of natural teeth to be used as reference points when the patient became edentulous.[8] The distance between the markings when the teeth were in centric occlusion was measured with a pair of calipers and recorded for further use, however, patients may not accept placing of tattoos on gingiva. Smith stated that the Boos Biometer was the best device for recording vertical dimension, however, it has condemned because the closing power of patient is influenced by pain and apprehension.[9] Clinically, we have observed that VDO varies in natural teeth in attrition cases and also when natural teeth contacts are lost. Clinical judgment plays a major role in the assessment of this important parameter in the construction of complete dentures and prosthodontic rehabilitation patients. Considering the disadvantages of previously used methods, this study was undertaken to find a simple and a feasible test to estimate VDO by studying the relationship between VDO and length of fingers. This feature of human anthropometry has not yet been explored in dentistry. Our study revealed sexual differences with higher values for VDO in males compared to females.[10] The studies conducted by Bhandari et al[11] have revealed a positive correlation between VDO and length of little finger in both males and females. In a similar study conducted by Ladda et al[12] a positive correlation has been found between VDO had length of index finger in males and that of little finger in females. In our study, a positive correlation was found between VDO and length of index finger in males and length of little finger in females in North Indian population. These differences in VDO could be related to growth differences in males and females in North Indian population.

CONCLUSION

The study revealed that length of index finger is almost equal to VDO in males and length of little finger is almost equal to VDO in females. The method is economical, reproducible and time saving and can be used reliably for recording VDO in North Indian population.

Source Of Support: Nil.

Conflict of Interest: None.

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