

The Proportion of Proto Malayan's And Deutro Malayan's Vertical Dimension Using Willis's Method, Mc.Gee's Method And Golden Proportion Concept Among Students of Faculty of Dentistry In University of Sumatera Utara

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Background

purpose : The purpose of this study was to determine differences in the proportion of the vertical dimension using Willis's Method, Mc.Gee's Method, and Golden Proportion concept in Proto-Malayan and Deutro Malayan

Materials and methods : The study was conducted on 92 students who conform the inclusion criteria. Subjects are grouped into four groups based on gender and ethnic; Proto Malayan males, Deutro Malayan females, Proto-Malayan female and Deutro Malayan female. Capturing the subject was done and measured using Corel Draw Graphics Suite 12 in accordance with the Willis's Method, Mc.Gee's Method, and Golden Proportion Concept. One Sample T Test was used to determine differences in the proportion of the subject's vertical dimension using each method above.

Results : There is no difference between the concept of Golden proportion to the proportion of the vertical dimension of Deutro Malayan males, Proto-Malayan females and Deutro Malayan females. There is no difference between the proportion of the vertical dimension of Proto Malayan males with Mc.Gee's method and in Deutro Malayan females with Mc.Gee's method. But there is a difference between the whole subject with the Willis's methods.

Conclusion : Based on these results, there is no difference between the Golden proportion concept to the vertical dimension of the three groups of subjects, so the proportion of the vertical dimension using the Golden proportion concept is more appropriate to the subject of research group compared with the Willis's methods and Mc.Gee's methods.

Keywords: The Proportion of Vertical Dimension, The Willis's Methods, The Mc.Gee's Methods, The Golden Proportion's Concept, Mongoloid, Proto Malayan, Deutro Malayan.

I. Introduction

In full dentures fabricated, recording jaw relations are being made to restore the occlusal plane, vertical dimension and centric occlusion. That procedure is one of the important step in the manufacture of full dentures in achieving functionality and aesthetic optimal.¹ To achieve these objectives, the recording must include the determination of the correct vertical dimension and in harmony with the temporomandibular joints, masticatory muscle function and facial muscle. Various techniques of determining the vertical dimension has been introduced, but there is no scientific method can be said accurate for all individual.¹⁻⁵ Technique of determining the vertical dimension in general are mechanically and physiological.⁶ The mechanical method such as jaw relation methods and recording pre-extraction methods that classified into three methods: radiographic profile, study casts, and facial measurement. Various methods of measuring faces with different gauge in determining the vertical dimension has been introduced, such as Sorrenson's method that uses Sorrenson's profile scale, Mc.Gee methods that use a ruler bending, Willis method that uses Willis's gauge, Interpupillary distance's method, dan Ear-eye distance method.^{7,11,12} These methods are continue to study their suitability of different races.

The Willis's method is the most popular method and has been used in clinical practice.^{7,8} Willis's method shows that the distance from the base of the nose or Subnasion (Sn) to the most anterior point of the lower edge of the mandible or Gnathion (Gn) and from pupil of the eye to the commissure of the lips when the teeth in occlusion, and concluded that both of the distance is equal.⁴ That method was introduced by Willis (1935), who were Caucasian and tested based on the characteristics of that race. Similarly with Mc.Gee's method that was introduced by Mc.Gee (1947) also were Caucasian. According to the Mc.Gee's method, in centric occlusion, a distance of Sn to Gn with the distance from pupil to the lateral projection of the junction line of the lips (stomion), the distance from Glabella to Sn, and the distance between the corners of the mouth at rest, is at least two, even three such measurement equal to one another and in accordance with the occlusal vertical dimension.^{4,5,13} Basnet et al. (2004) measured the occlusal vertical dimension of male and female in Aryan and

Mongoloid using Ear-eye Distance methods and Willis's method. They conclude that there is a relationship between the vertical dimension of occlusion with Willis's method.¹¹ Nagpal et al. (2013) state that Mc.Gee's methods and Willis's methods did not correspond to the Indian's occlusal vertical dimension.¹⁴

Recently, the Golden Proportion concept known to determine vertical dimension. The Golden Proportion concept shows that there is an ideal proportions in the whole universe, and that proportion is 1: 1.618 or 0.618: 1. Vertical relationship of the faces according to the Golden Proportion concept shows that the distance from the lateral nose (LN) to the chin (Me) is 1, and the distance from LN to frown (TRI or trichion) is 1.618, the distance of the mouth corner (Ch or cheilion) to the chin is 1, and the distance from the lateral canthus of the eye (LC) to the mouth corner is 1.618, as well as the distance from LN to Ch is 1 and from the corners of the mouth to the chin is 1.618.¹⁵⁻¹⁷ This concept was first originated from Greece around 500 BC. Although it appears that the concept of the Golden Proportion were Caucasian, but the concept is universal standards that can apply to the whole proportion in the universe, as well as on the body and face, and this concept regardless of race, age, gender, and other variables. Indonesian people is multiethnic belong to the Mongoloid race, forming sub-ras Proto Malayan and Deutro Malayan. Different ethnic groups are likely to have different skull and jaw pattern. Based on the above, the researchers felt the need to research the proportion of the vertical dimension of Proto Malayan and Deutro Malayan represented by dental students in University of Sumatera Utara using the Willis's Method, Mc.Gee's Method, and Golden Proportion Concept.

II. Materials And Methods

This research was observational analytic conducted in the Faculty of Dentistry, University of Sumatera Utara, the student with the inclusion criteria as follows: student belonging to the proto malayan (Batak, Gayo, Toraja, Sasak, Dayak, Nias, Kubu), and the Deutro malayan (Acehnese, Minang, Javanese, Sundanese, Malayan.) Three or more generations with an age range of 18-25 years, never perform facial reconstruction, not wearing either removable denture or fixed, no fillings, no teeth were removed that causing loss of occlusal stop, occlusion class 1 Angle, and is not being or have been treated orthodontic. Tools and materials in this study are a questionnaire sheet and informed consent form, the Canon EOS 60D 18 MP Digital Single Lens Reflex and tripod, measuring tape 5M / 16ft, the fixation tools of the head, the marker face, Corel Draw Graphics Suite 12, the USA, and SPSS Statistics 18.0 Software © 18. Subjects were selected using a questionnaire, and then were given a verbal explanation and written about the study procedures, and subjects signed informed consent sheet. Based on the results of selection, obtained 92 subjects, divided into 21 Proto Malayan males and 21 Deutro Malayan males, and 25 Proto Malayan females and 25 women Deutro Malayan females.

After that, the subject is positioned in the seat with the distance from seat into the background is 120 cm, natural head position, at the center of the focus of the camera, with eyes looking straight ahead. The position of the head is arranged so that the plain Frankfurt parallel to the floor. This study used a head fixation tools and there are two millimeter scale in the vertical and horizontal on these tools. The distance from the most outer point of the camera lens with subject was set one meter using a measuring tape (figure 1). Subjects were asked to close the mouth with teeth of the upper jaw and lower jaw in contact (dentition in occlusion). Then the photo shoot of the subject's face was done. After that, the vertical dimension of the subject in the photo measured through the Corel Draw Graphics Suite 12 is based on the Willis's method (Figure 2), the Mc.Gee's method (Figure 3), and the the Golden proportion concept (figure 4). Then the results were analyzed using SPSS Statistics 18.0 Software © 18..

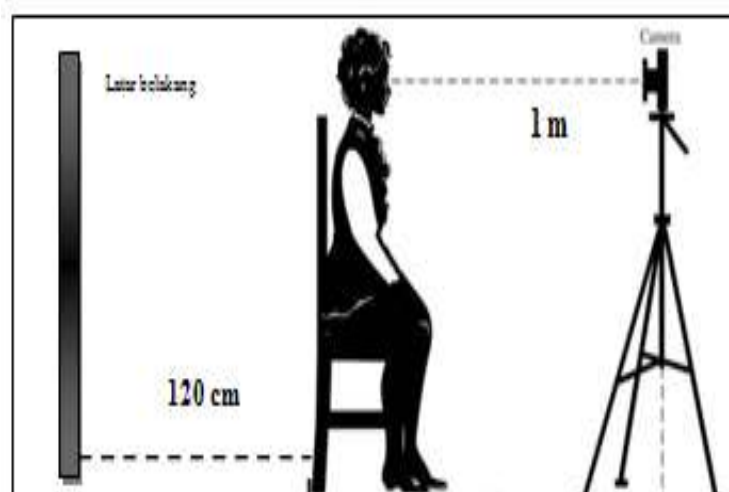


Fig 1. Schematic capture

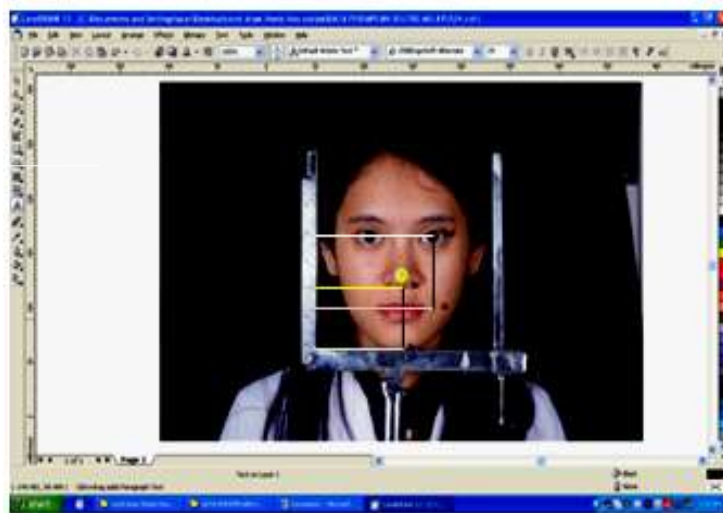


Fig 2.Measurement of the vertical dimension proportion using the Willis's method



Fig 3.Measurement of the vertical dimension proportion using the Mc.Gee's method



Fig 4.Measurement of the vertical dimension proportion using the Golden Proportion concept

III. Results

Results of analysis using one sample T Test showed that there are significant differences between the proportions of the vertical dimension to the whole subject with Willis's method (Table 1). Results of analysis using one sample T Test showed that there was no difference between the proportion of the vertical dimension of the Proto Malayan males with Mc.Gee's method and Deutro Malayan females with Mc.Gee's method (Table 2). While the results of the analysis using one sample T Test on the proportions of the vertical dimension in all four groups of subjects with the Golden proportion concept indicates that there is no difference between the proportion of the vertical dimension of the Deutro Malayan male to the Golden Proportion concept, the proportion of the vertical dimension of Proto Malayan females to the Golden proportion concept, and the proportion of the vertical dimension of the Deutro Malayan females to the Golden proportion concept (table 3).

Table 1. The difference of the vertical Dimension proportion with Willis's method by Gender and Ethnicity

Gender	Ethnic	n	mean	±SD	Willis's method	p
Males	Proto Malayan	21	0,879 : 1	±0,07	1 : 1	0,001*
	Deutro Malayan	21	0,906 : 1	± 0,08	1 : 1	0,001*
Females	Proto Malayan	25	0,900 : 1	±0,06	1 : 1	0,001*
	Deutro Malayan	25	0,898 : 1	±0,06	1 : 1	0,001*

*statistically significant at $p < 0,05$

Table 2. The difference of the vertical Dimension proportion with Mc.Gee's method by Gender and Ethnicity

Gender	Ethnic	n	mean	±SD	Mc.Gee's method	p
Males	Proto Malayan	21	1,049:1	± 0,12	1:1	0,084
	Deutro Malayan	21	1,091:1	± 0,13	1:1	0,004*
Females	Proto Malayan	25	1,062:1	± 0,12	1:1	0,015*
	Deutro Malayan	25	1,007:1	± 0,08	1:1	0,643

*statistically significant at $p < 0,05$

Table 3. The difference of the vertical Dimension proportion with Golden Proportion concept by Gender and Ethnicity

Gender	Ethnic	n	mean	±SD	Golden Proportion concept	p
Males	Proto Malayan	21	1,760:1	± 0,19	1,618:1	0,003*
	Deutro Malayan	21	1,677:1	± 0,17	1,618:1	0,134
Females	Proto Malayan	25	1,673:1	± 0,16	1,618:1	0,092
	Deutro Malayan	25	1,671:1	± 0,14	1,618:1	0,06

*statistically significant at $p < 0,05$

IV. Discussion

In this recent study, there are significant differences between the proportions of the vertical dimension to the whole subject with Willis's method, which means Willis's method is not suitable for use in measuring the vertical dimension in the group of research subjects. Handoko (2011) states that Willis's method is not appropriate on the subject of Indonesian student.²⁰ The difference between the proportions of the vertical dimension of the subjects with Willis's method can be caused by the method introduced by Willis who were Caucasian and tested based on the characteristics of that race, which where characteristics of Caucasians is different from Indonesian which included in the Mongoloid, especially in terms of shape and size of the face.²¹ Harvey stated (quoted from Turrel et al. 2006), only 27% of the 100 subjects in accordance with the Willis's method, Similarly, the results of Bowman and Chick's research (quoted from Turrel et al. 2006, which measures the vertical dimension of the teeth on 133 subjectd, found only 9% according to the Willis's method.⁴ Research conducted by Olaviar and olaviar (quoted from Farias-Neto et al. 2014) states that there is a difference

of 3 cm between the upper face and lower face in the Willis's method. From the measurement results, obtained the proportion of the vertical dimension in all four groups of subjects with Mc.Gee's method shows that there is no difference between the proportion of vertical dimension Proto Malayan males with Mc.Gee's method and there are no differences in Deutro Malayan females with Mc.Gee's method. The Conformity of the Mc.Gee's method to Proto Malayan males probably caused by the relationship between the origins of the tribe of Proto Malayan that came from Indian Yunnan region in China is still close with both India and Pakistan, so that even in this study, researchers used a Mongoloid race which included parts Proto Malayan to three generations, but it is also possible that the migration process causes the mixing of races. Majeed et al. (2015) conducted a research on the measurement of the vertical dimension of the Pakistani population with Mc.Gee's method, of Willis's method, and Interpupillary Distance method. They found that the Mc.Gee's method is suitable to the Pakistani population.²³

The results of the measurement of the vertical dimension proportion using the Golden proportion concept showed no difference between Deutro Malayan males with the Golden Proportion concept, among Proto Malayan females with the Golden Proportion concept, and among Deutro Malayan females with the Golden Proportion concept, in other words, the Golden Proportion concept in accordance with the third group of subjects. Mack (1991) said there is a Golden Proportion in the harmonious and balanced face, and according to Ricketts (1998), there is the Golden Proportion value in the whole body, including on the face, either on soft tissue measurement or radiographic.^{15,16} But the results of this study seen no difference between Proto Malayanmales with the Golden Proportion concept. The possibility of these differences relate to the pattern of facial development (dolichofacial, mesofacial, and brachyfacial) that is not controlled in this study.

V. Conclusion

Based on the study results, there is no difference between the Golden proportion concept to the vertical dimension of the three groups of subjects, namely Deutro Malayan males, Proto Malayan females and Deutro Malayan females. The proportion of the vertical dimension using the Golden Proportion concept is more appropriate for the group of subjects than the Willis's method and Mc.Gee's method, seen from more groups of subjects in accordance with the concept of the Golden Proportion.

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