

Estimation of New Equation for Triangle Anterior Dental Arch Form in Sub-Race Deutro Malay

Hidayati Hidayati¹, *Desy Purnama Sari¹

¹Department of Dental Public Health Faculty of Dentistry, Andalas University

*Correspondence email : hidayatid@dent.unand.ac.id

ABSTRACT

Each race around the world has a different arch form. Measurement of triangle anterior dental arch, analysis model of Maxilla is essential to support the success of orthodontic treatment. This study aimed to determine the new equation for triangle anterior dental arch form and predict space availability in designing adequate orthodontic treatment planning, especially in Sub-Race Deutro Malay. A *cross-sectional* study was conducted among the “normal” respondent with normal occlusion, including normal facial profile, overjet, and overbite (no asymmetrical arches). One hundred of Sub-Race Deutro Malay teenagers aged 18-23 years old participated. All respondents having normal occlusion were impressed by hydrocolloid materials and made a model study. Then, the data were analyzed by computerized analysis using *Microsoft Excel* version 16.0 to predict mathematical formulas. The mean of inter-canine width was 36.44 ± 4.18 ; midline to canine was 18.29 ± 2.07 ; central incisor to inter-canine was 14.49 ± 1.75 ; ratio among central incisor with inter canine and midline to canine was 0.89 ± 0.90 ; distal canine to the midline of central incisor was 23.26 ± 2.29 ; ratio among distal canine with the midline of central incisor and distal canine with the midline of central incisor was 0.89 ± 0.90 . This study found a new equation arch form of Sub-Race Deutro Malay and suggested new guidance of the anterior dental arch dimension. So, it is also highlighted that an adequate measurement of dental arch ratio among specific races can facilitate the success of orthodontic and prosthodontic treatment.

Keywords: dental arch, new equation, orthodontic, treatment.

1. INTRODUCTION

The shape of the human dental arch is configured by the relationship between the teeth and underlying alveolar bone in the presence of the circumoral musculature and forces [1]. Every dental arch form is unique, including size and shape depending on the race. Therefore, it may have considerable implications in the patient's diagnostic and treatment planning and may affect the esthetics space available, and ultimately the arch forms future stability [2]. No two individuals exhibit the same arch form and people of similar ethnicities [3].

Throughout the history of orthodontics, many orthodontic researchers have explored an ideal arch form and used mathematical equations variation to calculate the perfect arch form. Some literature is often used in conducting spatial analysis in adult

teeth, such as the point index and howes index. However, these indices have some disadvantages, namely, obtained based on calculations on the Caucasian, while in Indonesia, especially the West Sumatra region, most of the people belong to the Deutro Malay race [4]. There are still few studies on the shape, ratio, and dimensions of the jaw arch in the Deutro Malay race, so further research is needed to determine the prevalence of jaw arch types and mathematical predictions of the jaw curve in the Malay Deutro Sub Race, so that it can be used as a guide in developing an orthodontic treatment plan. This study aims to determine the new equation for triangle anterior dental arch form and predict space availability in designing adequate treatment planning of orthodontic, especially in Sub-Race Deutro Malay. Therefore, considering the variation of dental arch dimension among races, we are interested in taking averages from several individuals and customizing every arch form for each Sub-Race Deutro Malay.

2. MATERIALS AND METHODS

A cross-sectional study with a self-administered questionnaire was conducted among 100 teenagers. The sample consisted of respondents between the ages of 17-25 years, 29 were males, and 71 were females. This study included maxillary dental casts of college students at the Faculty of Dentistry, Universitas Andalas. One hundred respondents were eligible for this study based on the following criteria: 1) Ras Deutro withered two previous generations; 2) normal occlusion, normal overjet, and overbite with complete maxillary permanent teeth (except teeth 18 and 28); 3) no malposition of teeth; 4) no midline shift with the face and or labial frenulum; 5) no diastema; 6) no periodontal disease, 7) no history of orthodontic treatment.

Sagittal and transverse measurements of the maxilla arches were done from the cast. The measurement was taken from the reference point using sliding calipers, the mid incisal edge (buccal side), the canine tips. These points constitute the landmarks of the maxillary dental arch. The precision gain by using other points would be minimal because of the strong correlations observed between the different measurements taken from these points. The dimensions of the dental arches were determined according to the sagittal and transverse directions. The arch breadth was evaluated from the inter-canine width (A), the mean midline to canine (B), central incisive to inter-canine (C), distal canine to the midline of central incisive (D). This four components characterized both the triangle form and the dimension of a dental arch. As far as the form is concerned, the ratios determined were E and F.

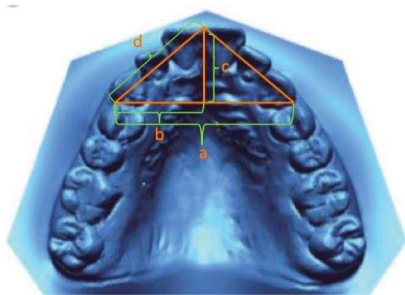


Figure 1. Triangle arch form measurement

3. RESULT

Category	Measurement variable	Mean±SD (mm)
A	Inter canine width	36.44±4.18
B	Width of the midline to canine	18.29±2.07
C	Width of central incisive to inter-canine	14.49±1.75
E	Ratio C to B	0.89±0.90
D	Width of distal canine to the midline of central incisive	23.26±2.29
F	Ratio D to A	0.63±0.76

4. DISCUSSION

An orthodontic or prosthodontic tradition of seeking a single ideal arch form supports the successful treatment [5]. The golden arch ratio has been used to analyze the dental arch estimation rewarding orthodontic and prosthodontic treatments for a long time. However, some methods are inconsistent with each jaw's actual dental arch measurement due to racial and ethnic variations [2,6,7]. Determination of arch measurement on some literature uses different points. [8]. Lee et al. (2013) and Othman et al. (2012) used points from the incisal edge and cusp canine to determine the inter-canine width. We use different ways with them to determine the inter-canine width. We found that the mean inter-canine width in normal occlusion was 36.44±4.18 mm. It is not similar to Lee et al. study that inter-canine width among Vietnamese was 29.84±1.6 mm and Korean 29.84±1.44 mm. It may be caused by different races and the point of measurement. Lee et al. was used the cusp edge of the left until right canine to determine the inter-canine width. Meanwhile, this study used distal canine of the left until right width to get accurate guidance without being affected by the un-symmetries canine position [3,9,10].

5. CONCLUSION

This study found a new equation arch form of Sub Race Deutro Malay and suggested new guidance of the anterior dental arch dimension. So, it is also highlighted that an accurate measurement of dental arch ratio among specific

ances can be a prerequisite for adequate planning and treatment of orthodontic and prosthodontic cases.

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