Original Research Article

Evaluating the validity of recurring esthetic dental proportion in young adults

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ABSTRACT

Objectives: An important aspect of cosmetic dentistry is developing a geometric or numerical proportion to associate the consecutive width of maxillary anterior teeth. New hypotheses in this area include the Golden proportion, golden percentage, and the recurrent esthetic dental (RED) proportion. This study used digital photos and computer analysis to examine the existing RED proportion associated with the widths of maxillary anterior teeth in people with permanent dentition.

Material and Methods: Sixty young adults (28 males and 32 females) were photographed from the front. Digital measurements were taken of all maxillary anterior teeth.

Results: To determine whether the RED proportion exists in the permanent dentition, the mean width proportion of the maxillary lateral incisor to central incisor and maxillary canine to lateral incisor was established. The average lateral incisor to central incisor width proportion of the right and left side was determined to be 70% and 71%, respectively. The average canine to lateral incisor width proportion was determined to be 80% and 78%, respectively.

Conclusion: The maxillary anterior teeth's consecutive widths did not exhibit RED proportions in the data that were examined. People's anterior tooth proportions differ based on their race and ethnicity. Thus, the RED ratio is not the only standard for rebuilding aesthetically acceptable smiles globally.

Keywords: Golden proportion, Recurrent esthetic dental proportion, Golden percentage

INTRODUCTION

Facial esthetics, gingival esthetics, micro esthetics, and macro esthetics are the four components of the smile design hypothesis. When speaking, laughing, or smiling, the lips and soft tissues of the face form a curvature. The condition of the gingiva, the interdental papilla's shape, and the existence of black triangles are all factors in gingival esthetics. Micro esthetic characteristics include incisal translucency, lobe development, and the structure of the anterior teeth. Face midline, tooth size, and tooth shape are examples of macro esthetic traits.[1-4]

The literature has identified various proportions for maxillary anterior tooth size. The concept of the golden ratio is founded on the idea that there is a relation between mathematical beauty and natural beauty. In accordance with this rule, the width of the maxillary lateral incisor needs to be equal to the width of the maxillary central incisor when viewed from the front. Therefore, the maxillary lateral incisor needs to be 62% wider than the maxillary central incisor, and the maxillary canine must be 62% wider than the resultant lateral incisor.

According to Snow's "Golden Percentage" ratio, the width of the maxillary central incisor should be 25% of the intercanine separation, calculated from the distal of the canines on one side to the opposite side. The Recurring esthetic dental proportion (RED) was Ward's idea. He rooted his hypothesis over the findings of his research, wherein he defined the RED proportion as the proportion of successive teeth's widths that remain constant as they go away from the midline.[4]

MATERIAL AND METHODS

After the approval from the Institutional Ethical Committee and informed written consent (IEC/VSPMDCRC/16/2022) 60 dental students, 32 females, and 28 male students in 20–26 age were recruited for this study.

Inclusion criteria

The following criteria were included in the study:
- All teeth present
- Properly aligned anterior teeth.

Exclusion criteria

The following criteria were excluded from the study:
- Craniofacial and dental malformations that are inherited or acquired
- Orthodontic treatment history
- Restorations in anterior dentition
- Participants who are unwilling to participate.

Image capture

Throughout the course of the study, pictures of the individuals were shot using a Nikon D200(4) starting at the tip of the nose toward the tip of the chin, the camera was positioned and angulated to capture an accurate snapshot of the face. The working distance was set at 60 cm between the camera and the subject. With respect to this set position, a tripod was used to stabilize the camera. The subject's smile was captured. The image files were loaded onto a personal computer. Utilizing the Adobe Photoshop CS4 Extended software, pictures were examined. Using the scale tool in MS PowerPoint software, the data of sizes of the maxillary central incisor, lateral incisors, and canines were extracted.[4]

Measurements

The width of each lateral incisor was divided by the width of the neighboring central incisor, and the concluding number was multiplied by 100 to determine RED proportion. Besides, the width of each canine was divided by the width of the neighboring lateral incisor, and the obtained value was multiplied by 100. The central incisor, lateral incisor, and canine are in RED proportion if the obtained values remain uniform.

Statistical analysis

The data were entered into an Excel spreadsheet. Using SPSS Statistics version 22, the analysis was carried out. Calculation of descriptive statistics was done. Paired t test was used for statistical analysis with P value as 0.05.

RESULTS

The mean values and standard deviation for RED proportions for males and females are listed in Table 1. RED proportion between central incisor and lateral incisor lie in the 70.83–71.18% range. RED proportion between canine and lateral incisor lie in the 78.97–80.47% range.

DISCUSSION

To achieve a cosmetic restoration, it is crucial to determine the numerical or geometrical relationship between the teeth. It would have been beneficial if the existing relationship theories were confirmed by statistically verifiable relationships.[1] Sixty young dental students participated in this study, 28 of whom were male and 32 were female.

According to the findings of this study, the RED proportion is between 70.83% and 71.18% when comparing the width of maxillary lateral incisors to the width of central incisors. RED proportion while comparing the width of the maxillary canine to the width of the lateral incisor is between 78.97% and 80.47%. The ratio between the lateral incisor and canine, as well as between the central and lateral incisors, is not constant in the present study. As one advances distally, the ratio increases.

The ratio of the width of the maxillary lateral incisors to the width of the central incisors, which was measured at 70.83–71.18% coincides with the 70% RED proportion as proposed by Ward[2] and the mean percentage proposed by Ali Fayyad *et al.* that ranged from 66% to 78%.[5]

According to Ward, the ratio of the lateral incisor to the canine and the lateral incisor to the central incisor is not consistent.

Therefore, the data from this study do not support the RED proportion hypothesis when it appeals to natural dentition.

Table 1: RED proportions' mean values and standard deviations and RED proportion between central incisor, lateral incisor, and canine.

	Gender	n	Mean	Standard error	Standard deviation	Minimum	Maximum
Rt. Canine/lateral incisors	Female	32	80.579	1.8469	10.4475	53.8	97.2
	Male	28	80.336	2.3856	12.6231	53.8	109
	Total	60	80.475	1.4736	11.4143	53.8	109
Rt. Lateral/central incisors	Female	32	71.147	1.4231	8.0501	57.6	93.3
	Male	28	70.486	1.3714	7.2568	56.4	93.3
	Total	60	70.838	0.9854	7.6328	56.4	93.3
Lt. Lateral/central incisors	Female	32	72.181	1.3961	7.8977	57	89.7
	Male	28	70.036	1.3087	6.9251	57.6	89.1
	Total	60	71.180	0.9651	7.4756	57	89.7
Lt. Canine/lateral incisors	Female	32	79.072	1.8643	10.5459	52.7	100
	Male	28	78.868	2.0800	11.0064	52.7	97.7
	Total	60	78.977	1.3777	10.6716	52.7	100

RED: Recurrent esthetic dental

CONCLUSION

Within the confines of the study, the RED proportion was not evident in the normal dentition in the given population.

Ethical approval

Ethical approval was obtained from institutional ethics committee with reference number IEC/VSPMDCRC/16/2022, dated 16-3-2022.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

Dr. Saee Deshpande is on the Editorial Board of the Journal.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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