



**Research Article**

ISSN: 2581-3218  
IJDR 2018; 3(3): 66-68  
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## Evaluation of existence of anthropometric proportions in dentitions of females who are satisfied with their smile: a cross sectional study

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### Abstract

**Aim:** To evaluate Preston's ratio and Recurrent Esthetic Dental (RED) proportion in smiles of female patients who are satisfied with their smiles. **Methodology:** 86 subjects who fulfilled inclusion criteria for the study were selected. A distance of 30 inches was maintained between camera and subject. With the help of cheek retractor, cheeks were retracted and pictures of subjects were taken with camera. Images were transferred to computer. Using Bit rule software, mesio-distal width of upper anteriors was measured. Data were recorded and transferred to excel sheet. Data were analyzed using descriptive statistical tests and conclusion was drawn. Arithmetic mean and student t test were employed to evaluate the data. Level of significance was,  $p=0.05$ . **Results:** Out of 86 smiles, 20 smiles presented with RED ratio. 27 smiles demonstrated Preston's ratio in lateral incisor to central incisor proportions, whereas 20 smiles demonstrated Preston's ratio in canine to lateral incisor proportions. **Conclusion:** Preston's ratio was more prevalent among lateral incisors and central incisors of all the smiles included in this study. But on analysis of canine to lateral incisor proportions, theory of Recurrent Esthetic Dental ratio and Preston's ratio displayed same results.

**Keywords:** Preston's ratio, Recurring Esthetic Dental Ratio, Golden Proportion.

### INTRODUCTION

In modern society, social smile is one of the cornerstones to enhance not only self-esteem, but also social opportunities, professional performance and employment prospects.

"What constitutes good dental esthetics" has always been a topic of debate, since it varies from individual to individual depending on his societal background. Achieving a geometrical gauge for anterior maxillary section has been ventured for decades.

The ideal dimension for the anterior teeth is a difficult task to accomplish due to the individuality of each person. Many authors have suggested the use of mathematical or geometrical models to try to solve this issue, to obtain an ideal and harmonious proportion of the anterior maxillary teeth to improve rehabilitation or restoration procedures.<sup>1,2</sup>

Formulating a geometric guide to relate successive dimensions of anterior segment of teeth is a crucial part in esthetic dentistry.<sup>3,4</sup>

Pythagoras in the 6th century BC was the first to describe Golden Proportion which is 1.618. In 1973 Lombardi proposed its application in the field of esthetic dentistry.<sup>5,6</sup> In 1978, Levin also advocated this idea.<sup>7</sup>

Though lot of textbooks have mentioned that obtaining golden proportion while restoring anteriors could be helpful, there are studies which have reported against it. Mahshid M et al, concluded that this ratio is not a frequent finding in esthetic smiles.<sup>8,9</sup>

Therefore, to address the constraints of golden proportion several other theories like Preston Proportion; Golden Percentage; the Recurring Esthetic Dental (RED) Proportion; and, more recently, Proportion Gauge have been put forward.<sup>3,4</sup>

The present study has evaluated the validity of Preston's ratio and RED ratio between the dimensions of the upper anterior teeth in individuals who are satisfied with their smiles.

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## Preston's Proportion

In 1993, Preston suggested that the optimal proportion between width of lateral and central incisors should be 66% and between width of lateral incisor and canine should be 84% when viewed frontally.<sup>1,8</sup>

## Recurring Esthetic Dental Proportion

In 2001, Ward suggested RED proportion, in which the ratio between two adjacent teeth –when observed in a frontal perspective should remain distally constant. This proportion does not have a fixed value, he recommended a range of RED proportions from 62% to 80%.<sup>1,9</sup>

The objective of present study was to evaluate the existence of these two mathematical proportions in dentition of females who are satisfied with their smile. Thus it will help to know the importance of restoring these proportions during aesthetic treatment of patients, especially in oral rehabilitation, management of peg laterals, replacement or restoration of carious anterior teeth.

## MATERIALS AND METHODS

Subjects selected for this study were female, bachelor of dental surgery (BDS) students of KVG dental college and hospital Sullia.

### Inclusion criteria:

- Females (students studying in KVG Dental College).
- Age group 18-25yrs.
- Presence of healthy anterior maxillary teeth from canine to canine.

### Exclusion criteria:

- Missing teeth in the maxillary anterior region.
- Presence of restorations/cavities.
- Presence of any crown in upper anterior teeth region.
- History of orthodontic treatment.
- Misalignments in upper anteriors.
- Periodontal defects in the maxillary anterior teeth.

## METHODOLOGY

86 subjects who fulfilled inclusion criteria for the study were selected and were placed in the natural head position (NHP). A distance of 30 inches was maintained between camera and subject. With the help of cheek retractor, cheeks were retracted and pictures of subjects were taken with camera. Images were transferred to computer. Using Bitrule software, mesio-distal width of upper anteriors was measured. Data were recorded and transferred to excel sheet. Data were analysed using descriptive statistical tests and conclusion was drawn. Arithmetic mean and student t test were applied to evaluate the data.

Level of significance,  $p=0.05$

## RESULTS

Out of 86 smiles, 20 smiles presented with RED ratio [Fig: 1]

27 smiles demonstrated Preston's ratio in lateral incisor to central incisor proportions, whereas 20 smiles demonstrated Preston's ratio in canine to lateral incisor proportions.

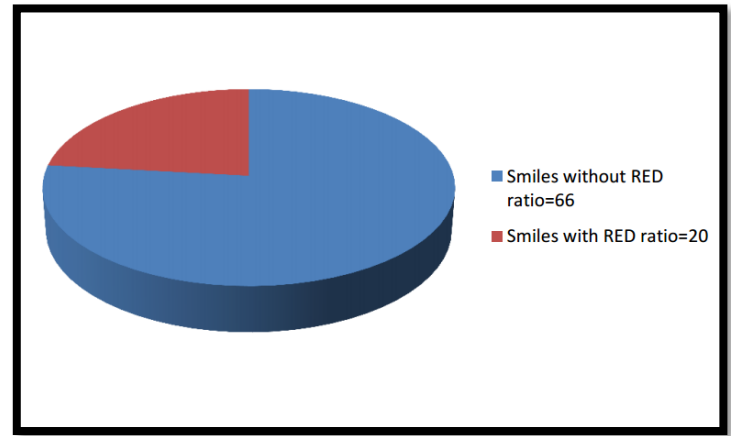


Fig 1: Recurrent Esthetic Dental Ratio

Table 1: Evaluation of existence of Preston's ratio

	Ratio	Mean	Recommended Preston's ratio	Std. Deviation	t	p
Right side	Lateral incisor/central incisor	0.68	0.66	0.06	1.642	0.104
Left side	Lateral incisor/central incisor	0.68	0.66	0.05		
Right side	Canine /lateral incisor	0.78	0.84	0.11	-2.259	0.026*
Left side	Canine /lateral incisor	0.79	0.84	0.11		

Table 1 depicts comparison of proportions in right and left sides of the dentition. It revealed that there was negligible significant variation in the proportions of lateral incisors to central incisors ( $p=0.104$ ) but there was significant difference in the proportions of canine to lateral incisors. ( $p=0.026$ ).

## DISCUSSION

An impressive esthetic smile goes beyond well aligned white teeth. It should be in harmonious association with the rest of the muscular composition of face.<sup>10</sup>

Golden ratio which has synonyms like divine proportion and golden ratio is a well-accepted notion in the branch of art, mathematics, and architecture. For decades, it was believed that this proportion plays a vital part in human apprehension of good looks.<sup>11</sup>

But Mahshid M et al in 2004 concluded that the golden proportion is not as much important in esthetic smiles as it was believed to be.<sup>8</sup>

Later research work by several authors challenged this concept and proposed alternate guidelines to achieve ideal dimensions of the teeth in relationships to each other.<sup>[2,12,13,14]</sup> Following are certain studies which stood against the concept of golden proportion in dentition:

Rita M E et al, in their study showed that golden ratio was not a frequent finding among the segment of teeth which was subjected to this study. With small modifications and taking into contemplation the ethnic differences, Snow's golden percentage was more logical and appropriate.<sup>15</sup>

A study by Al-marzok et al was conducted on Malaysian population and it was found that the divine ratio did not exist between the recognized dimensions of maxillary anterior teeth. No golden standard were detected for the proportions of maxillary incisors.<sup>16</sup>

Ali Fayyad M et al in 2006 and Murthy B S V et al (2007) conducted a study to investigate the existence of the divine proportion, RED proportion, and golden percentage among the dimensions of maxillary anterior teeth. In their study RED and golden percentage were more evident when compared to golden proportion.<sup>2,3</sup>

Apart from golden proportion, RED and Preston's ratio have also managed to seek attention in esthetic dentistry. In present study, these two proportions were evaluated and it was found that 20 smiles presented with RED. This study also reveals existence of Preston's ratio among upper anterior. It was evaluated separately for lateral to central incisors and canine to lateral incisor. The findings showed that Preston's ratio for lateral incisor to central incisor was more prevalent (observed in 27smiles) than the ratio for canine to lateral incisor (observed in 20 smiles). On comparison of left to right sides of dentition, there was no significant difference between lateral incisor to central incisor ratios (p value= 0.104), but there was a significant difference between canine to lateral incisor ratios. Yet there are few studies which have disapproved concept of RED. Murthy in 2008, and Fayyad in 2006, Ahmed N et al in 2014 matched the mean width proportion of upper lateral incisor to central incisor with mean width proportion of maxillary canine to lateral incisor. They concluded that the RED proportion is not a reliable proportion for achieving balanced dimensions of maxillary teeth.<sup>2,3</sup>

## CONCLUSION

Following conclusions can be drawn from this study:

Preston's ratio was more prevalent among lateral incisors and central incisors of all the smiles included in this study. But on analysis of canine to lateral incisor proportions, theory of Recurrent Esthetic Dental ratio and Preston's ratio displayed same results.

Further studies are recommended in this field to gain certainty regarding existence of various anthropometric proportions which in turn would be helpful in rendering precise esthetic treatment to the patients.

## Conflict of Interest

None.

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