ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at:www.ijmacr.com

Volume – 8, Issue – 3, May - 2025, Page No.: 123 – 133

Comparison of Variations in Golden Proportion, Golden Percentage, and Recurring Esthetic Dental Percentage in Natural Smiles across Two Age and Gender Groups: An in-Vivo Study

[1]Kanchan Sahwal, Tutor, MGM Dental College and Hospital, Navi Mumbai, India

[2]Veena Saraf, Professor, Rural Dental College, PIMS, Loni, India

[3]Umesh Palekar, Professor, Rural Dental College, PIMS, Loni, India

Corresponding Author: Kanchan Sahwal, Tutor, MGM Dental College and Hospital, Navi Mumbai, India.

How to citation this article: Kanchan Sahwal, Veena Saraf, Umesh Palekar, "Comparison of Variations in Golden Proportion, Golden Percentage, and Recurring Esthetic Dental Percentage in Natural Smiles across Two Age and Gender Groups: An in-Vivo Study", IJMACR- May - 2025, Volume – 8, Issue - 3, P. No. 123 – 133.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background and Objectives: Creating geometric or mathematical proportions to relate the mesiodistal length of anterior teeth is one of the key components of aesthetic dentistry. In this sector, notions like the "Golden Proportion", "Golden Percentage", and "Recurring Esthetic Dental Percentage" have been introduced with wide variations. Hence, the primary objective of this research was to compare the variations in the Golden Proportion, Golden Percentage, and Recurring Esthetic Dental (RED) Percentage with natural smiles across two age and gender groups of front teeth in the upper arch.

Materials and Methodology: Two hundred participants standardized frontal photographs were taken, of which 100 were in the age groups of 20 to 25 and 40 to 45 years, respectively, with 50 males and 50 females in each. Using a digital vernier caliper, the mesiodistal length of the right central incisor[11] was measured. Then, using the software application, the anterior maxillary tooth was digitally measured. After recording the measurements, the three theories were used to analyze the data.

Results: In natural dentition, the anterior maxillary teeth's length did not follow the golden proportion. The value of the RED percentage increased as one went distally. Additionally, the findings showed that, in terms of relative tooth length, the golden % remained steady. When six anterior maxillary teeth were measured from the front, the central incisor made up 23%, the lateral incisor 15.5%, and the canine 11.5% of the total length.

Conclusion: Neither the golden proportion nor the RED percentage is appropriate for relating the consecutive length of the anterior maxillary teeth in the natural dentition. However, if percentages are changed to

account for the ethnic makeup of the population, the golden percentage hypothesis can be used.

Keywords: Proportional smile design, Esthetic Dental Proportion, Dental Percentage.

Introduction

A smile is a key component of the beauty of a person. Facial expressions reflect feelings of pleasure, kindness, or amusement. The best individual to recognize and evaluate smile quality is usually a dentist. Additionally, he could plan restorations that complement smiles and alter the quality of grins using newly developed inventive techniques and cutting-edge restorative materials. Consequently, dentists need to understand the various components of an attractive smile.

Infants respond more favorably to good-looking faces than unappealing ones, according to research by Schein et al1. They also choose softer arcs over abrupt angles[1]. Therefore, when restoring or replacing the anterior maxillary teeth, we must reflect the unique dentofacial characteristics of everyone as well as the wide range of natural teeth proportions.

The dentofacial and dental components combine to form facial esthetics. The lips and smile related to the face are part of the dentofacial composition. The link between the teeth's position, size, form, color, and relationship to the alveolar bone and gingival tissues is referred to as the dental composition[2]. Maintaining a harmonious ratio between their breadths is one of the most crucial jobs when restoring or replacing anterior maxillary teeth. The Golden proportion4-6 has been proposed as a scientific rather than an arbitrary perception7 for dental composition, according to Beder[3], who claimed that various sections of the faces and bodies were best associated to this proportion. According to the golden proportion, the ratio of a larger part's size to a smaller part is always 1.618:18, a mathematical constant. The "Sacred geometry", "the magic numbers", and "the golden cut" are some names for this connection between geometry and mathematics.[9]. The golden ratio, according to Preston[10], does not apply to people who have an aesthetically pleasing smile.

The specific proportional value can differ among patients based on their facial shape, bone structure, and overall body type, as noted by Rosenstiel, Ward, and Rashid[11], who were the pioneers in this recognition. They acknowledged the existence of variation and the impossibility of proportional grin designs adhering to exact mathematical formulas. As one advances distally from the central incisor to the canine, RED proportion advises using a consistent proportion to reduce the visual breadth of teeth. Depending on the heights of the anterior maxillary teeth, the precise proportion value can vary between persons. Patients with a more ectomorphic body shape should have a smaller RED proportion, whereas those with a more endomorphic body shape should have a bigger RED proportion. Ward DH12 suggested that the Recurring Esthetic Dental (RED) proportion maintains a constant relationship in the successive breadth of teeth as one moves away from the center.

Snow[13] performed a bilateral study of each tooth's breadth as a proportion of the six anterior teeth's combined apparent breadth. To establish an aesthetically acceptable grin, he developed the "golden percentage", according to which each tooth's proportional breadth should be: canine 10%, lateral 15%, central 25%, central 25%, lateral 15%, and canine 10% of the total distance across the anterior region.

In the quest for creating aesthetic restorations, several researchers[7,14,15] have proposed using geometric or

mathematical proportions to illustrate and depict the connection between anterior maxillary teeth through midline photographs[16].

Additionally, Bishara SE et al concluded that changes in arch breadth occur from infancy until middle age. Hence, these restrictions must be understood by clinicians and their patients[17].

With such variations in observation made by different researchers, a greater understanding of these geometric or mathematical proportions is needed. In order to develop an objectively quantifiable breadth ratio between the anterior maxillary teeth to improve dental esthetics, this study aims to assess if the Golden Proportion, RED Proportion, and Golden Percentage exist in the natural dentition of two age and gender groups. The null hypothesis states that no significant differences exist in the Golden Proportion, Golden Percentage, and Recurring Esthetic Dental (RED) Proportion with natural smiles across two age and gender groups for both the right and left anterior maxillary teeth.

Materials & Methodology

Institutional ethical committee approval was obtained for the study. The study took place at the Rural Dental College's Department of Prosthodontics, Pravara Institute of Medical Sciences (Deemed University), Loni, Maharashtra.

In all, 200 participants (100 men and 100 women) from the Rural Dental College in Loni, Maharashtra, between the ages of 20-25 and 40-45 were chosen from the OPD of the prosthodontics department. Following were the inclusion criteria: No history of missing teeth except for possibly the 3rd molar, healthy gingival and periodontal condition, no history of restoration in the anterior maxillary teeth involving facial, inter-proximal or incisal surfaces, no history of orthodontic treatment, no attrition/abrasion/erosion/fracture of incisal edges. Subject having any alignment or discoloration of teeth were excluded from the study.

Photographic methodology

Facial frontal photographs were made at 6 6-foot (72 inches) distance from the tripod to the chair kept for the subjects to sit. Tripod's two legs were in front and one leg behind (Fig. 1). The camera had the following specifications: Lens set to 100mm magnification, Shutter Speed 1/200, Aperture F 5.6, ISO 200, Flash ON (with flash exposure compensation of 2).

Patients were instructed to maintain a straight posture and to position their head such that the Frankfort Horizontal and Interpupillary planes were both parallel to the horizontal floor while gazing at the camera. (Fig. 2). They were asked to exhibit a natural smile with facial muscles relaxed. The nose was in the center of the image. All the photographs were made by one photographer[18,19.]

The digital vernier caliper was used to measure the right central incisor's (11) mesiodistal breadth. (Fig. 3). The photographs then were opened in the Analyzing Digital Images (Version 3) to calculate the remaining mesiodistal (MD) breadth of anterior maxillary teeth. Every photograph was calibrated by the known MD of 11 (Fig. 4), and the remaining MD of the teeth were calculated (Fig. 5,6,7,8,9). All the measurements were recorded thrice by a single operator, and their mean was used for further analysis to minimize the error. A master chart containing all the data was prepared in Microsoft Excel.

Figure 1: Photography set up

Figure 2: Facial frontal Photograph

Figure 3: Perceived mesiodistal breadth of 11 measured with the Digital Vernier caliper

Figure 4: Mesiodistal breadth of 11 for the calibration of the image in software

Figure 5: Perceived mesiodistal breadth of 12 in software

Figure 6: Perceived mesiodistal breadth of 13 in software

Figure 7: Perceived mesiodistal breadth of 21 in software

Figure 8: Perceived mesiodistal breadth of 22 in software

Figure 9: Perceived mesiodistal breadth of 23 in software

The Proportion according to Golden Proportion concept was evaluated by dividing both the mesiodistal breadth of the maxillary right canine[13] and the apparent mesiodistal breadth of the right central incisor[11] by the right lateral incisor[12].

The percentage was assessed using the Golden Percentage concept. The breadth from the distal surface of one canine to the contralateral canine was added to determine the total breadth of the anterior maxillary.

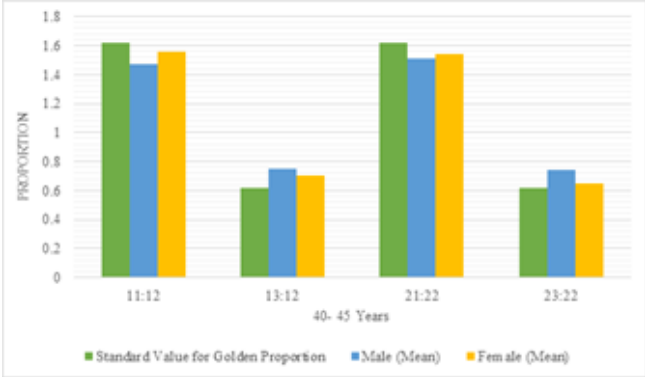
The breadth of each tooth—the central incisor, lateral incisor, and canine—is divided individually by the combined breadth of the six anterior maxillary teeth, multiplied by 100, to determine its golden percentage. The six anterior maxillary teeth are in the ideal proportion if the numbers from canine to canine are 10%: 15%: 25%:: 25%: 15%: 10%.

Observation and Results

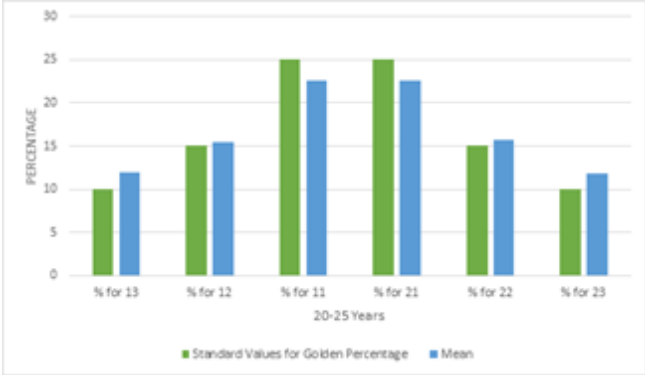
The details collected from 200 subjects were evaluated for the presence of the Golden Proportion, Golden Percentage, and RED Proportion in natural dentition.

Graph 1: Comparison between means of the Proportion of the maxillary anterior teeth in subjects both male and female aged 20 - 25 years with the Golden Proportion concept

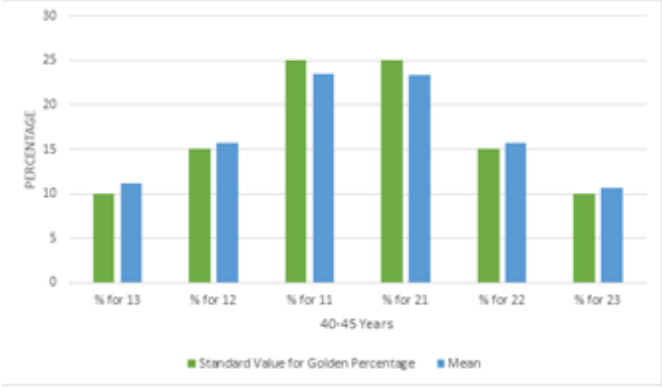
Graph 2: Comparison between means of Proportion of the maxillary anterior teeth in subjects both male and female aged 40 – 55 years with the Golden Proportion concept



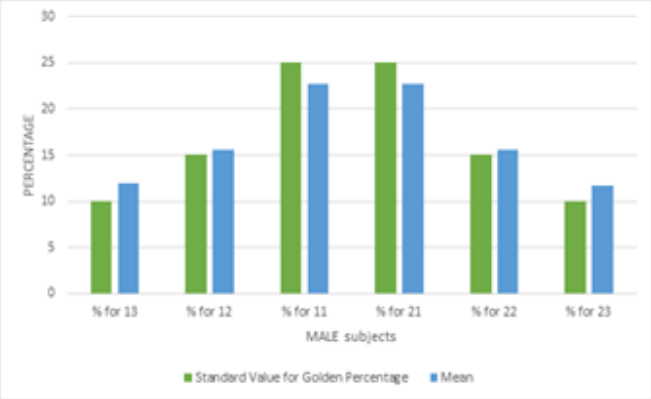
Graph 3: Comparison between means of Percentage of maxillary anterior teeth in age 20 - 25 years with the Golden Percentage concept



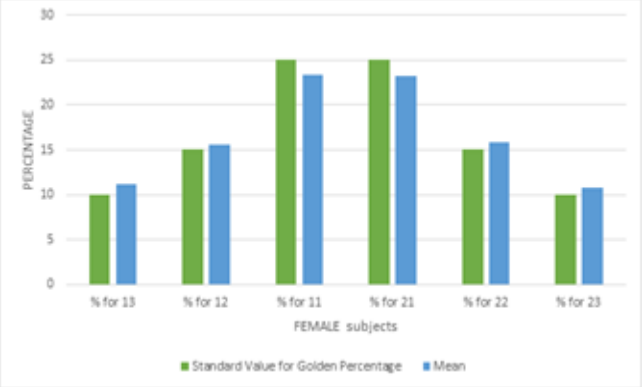
Graph 4: Comparison between means of Percentage of maxillary anterior teeth in subjects aged 40 - 45 years with the Golden Percentage concept



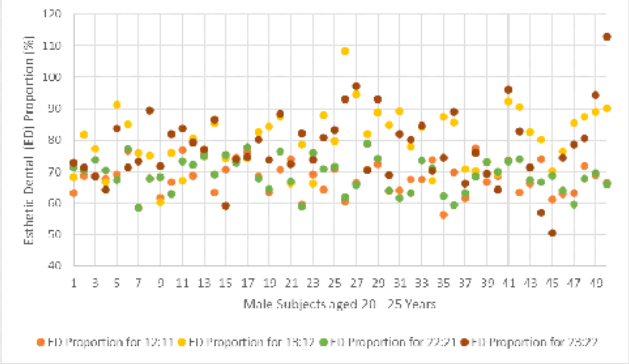
Graph 5: Comparison between means of Percentage of male subjects' maxillary anterior teeth using the Golden Percentage theory.



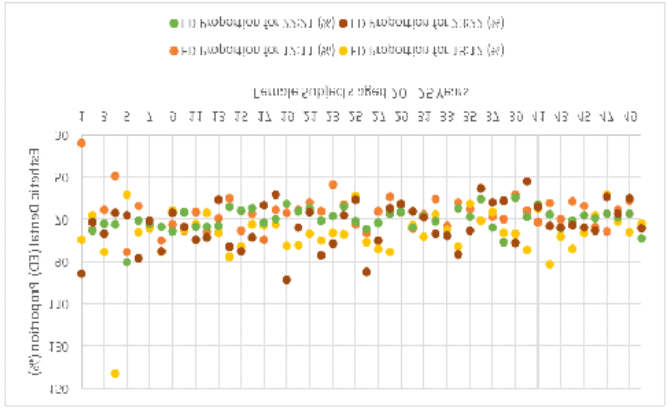
Graph 6: Comparison between means of Percentage of maxillary anterior teeth in female subjects with the Golden Percentage concept.



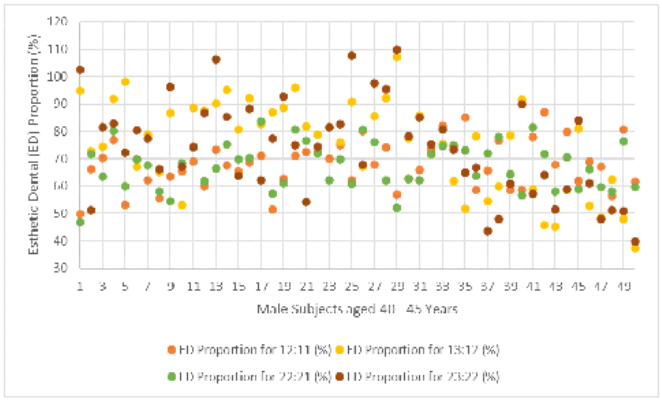
Graph 7: Evaluation and comparison of maxillary anterior teeth in male subjects aged 20 - 25 years with the RED Proportion concept



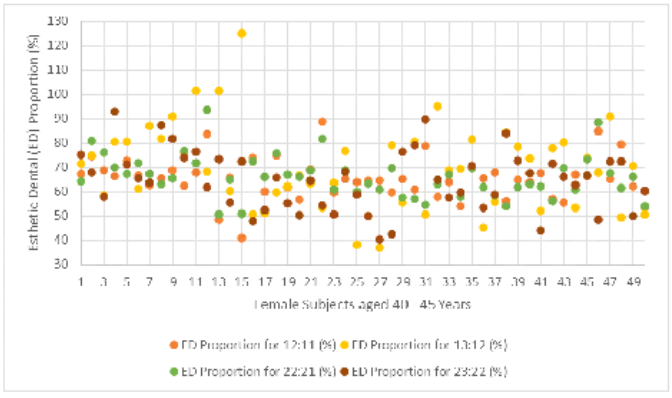
Graph 8: Evaluation and comparison of maxillary anterior teeth in female subjects aged 20 - 25 years with the RED Proportion concept



Graph 9: Evaluation and comparison of maxillary anterior teeth in male subjects aged 40 - 45 years with the RED Proportion concept



Graph 10: Evaluation and comparison of maxillary anterior teeth in female subjects aged 40 - 45 years with the RED Proportion concept



.

According to the Golden Proportion, the ratio of anterior maxillary teeth (Graphs 1, 2) demonstrated that the 20–25 age group varied more than the 40–45 age group. In contrast to the Golden Proportion notion, the ratio of anterior maxillary teeth (Graphs 1, 2) revealed that male individuals varied more than female ones.

In contrast to the 10%: 15%: 25%: 25%: 15%: 10% of the Golden Percentage concept, the percentage of anterior maxillary teeth in the 20 to 25 years, and 40 to 45 years age group (Graph 3,4) was 11.95%: 15.59%: 22.59%: 22.59%: 15.68%: 11.77%, and 11.14%: 15.57%: 23.42%: 23.39%: 15.67%: 10.7% respectively.

Percentage of anterior maxillary teeth (% of 13: % of 12: % of 11: % of 21: % of 22: % of 23) in male and female subjects (Graph 5,6) showed, 11.9%: 1.58%: 22.72%: 22.59%: 15.53%: 11.67% and 11.21%: 15.58%: 23.29%: 23.28%: 15.58%: 10.8% respectively as compared to 10%: 15%: 25%: 25%: 15%: 10% of Golden Percentage concept.

As demonstrated in male and female participants and the age group of 20 to 25 years and 40 to 45 years, none of the subject's esthetic dental proportions (Graphs 7, 8, 9, and 10) were repeated through anterior maxillary teeth. Because the results obtained varied, the null hypothesis is rejected.

Discussion

In today's health and beauty-conscious society, a person's smile is seen as a crucial element of their overall appearance and welfare. Psychologists have gathered a lot of information demonstrating how important appearance is in society[20].

Beall AE[21] research indicates that a nice smile with attractive teeth can make you seem more attractive, intelligent, successful, and friendly. There isn't much scientific information in the dental literature to use as a reference for defining the right size and form of anterior teeth. To attain the best outcomes in esthetic oral rehabilitation, it would be beneficial to provide certain criteria to examine beauty using known comparative metrics.

In order to define tooth shapes and produce more aesthetically pleasing dental restorations, several authors[5,6,11,12,13,28] have argued for the use of geometric or mathematical proportions.

The first article on the use of the Golden Ratio in dental aesthetics was written by Lombardi RE[5], who argued that the repeated ratio should be achieved using a continued proportion, meaning that in a perfect dentofacial composition, the lateral to central breadth and the canine to lateral breadth should be repeated in proportion from the frontal aspect. According to this approach, the proportion between the breadth of your central and lateral incisors is key. Once that's established, this ratio can be used to help properly position any tooth and fill in gaps for a balanced smile. Those humble beginnings sowed the seeds of Golden Proportion studies, which later undertook main directions in the field of prosthodontics and dentofacial orthodontics.

Snow[13] proposed the concept of "Golden Percentage" in which how your front teeth look with respect to each other. It suggests calculating the apparent breadth of each tooth as a percentage of the entire breadth of your front smile. By analyzing these percentages on both sides, dentists can aim for a balanced smile, where certain teeth naturally draw the eye and everything is in good proportion.

Ward's[12] RED proportion means that the breadth of each tooth should stay the same as you go back along the

dental arch. This provides more flexibility than just using a fixed 62% rule.

Additionally, Bishara et al.[17] concluded that although dental arch breadths alter from infancy until mid-adulthood, there is no scientific justification for expanding the arches in the average patient beyond their set dimensions at the time of the canine and molar's full eruption. Patients and healthcare professionals should be informed of these restrictions.

Thus, to assess the variation in Golden Proportion, Golden Percentage, and RED Proportion among 200 people (100 male and 100 female subjects) with natural dentition in two age groups, the current study was carried out. After making Digital photographs, calibration was made in the software using the mesiodistal breadth of the right central incisor of the maxilla as determined by a digital vernier caliper.

Overall findings indicated that the golden ratio did not appear to exist. The proportion of anterior maxillary teeth in the 20-25 years (14.8 - 3.2%) age group had more variation than 40-45 years age group as compared to the Golden Proportion concept. The proportion of anterior maxillary teeth showed that males (18.2 - 6.2%) had more variation than female subjects as compared to the Golden Proportion concept. Thus, these findings were supported by Mahshid M et al[4], Fayyad MA et al[22], Gillen RJ et al[23], Hasanreisoglu U et al[24], that the golden ratio was unusual as a component of an attractive grin. Studies by Davis NC[2], de Castro et al[8], Basting RT et al[25], disagreed with the results of the current study.

The evaluated % of anterior maxillary teeth (% of 13: % of 12: % of 11: % of 21: % of 22: % of 23) in 20 to 25 years and 40 to 45 years age group were 11.95%: 15.59%: 22.59%: 22.59%: 15.68%: 11.77% and 11.14%: 15.57%: 23.42%: 23.39%: 15.67%: 10.7% respectively as compared to 10%: 15%: 25%: 25%: 15%: 10% of Golden Percentage concept. And in male and female subjects were 11.9%: 15.89%: 22.72%: 22.59%: 15.53%: 11.67% and 11.21%: 15.58%: 23.29%: 23.28%: 15.58%: 10.8% respectively as compared to 10%: 15%: 25%: 25%: 15%: 10% of Golden Percentage concept.

The value of the lateral incisors agreed with those indicated by Snow[13], who offered the values of 25%, 15%, and 10% as that of the Golden Percentage. The value of the central incisors was somewhat lower, and the value of the canines was slightly higher. When the age group was compared 40-45 years age group had central incisor value higher than the 20-25 years age group. When the comparison in males and females was done, the central incisor value was higher in females as compared to males.

The breadth of the canines appears to be slightly greater, and the breadth of the central incisors appears to be slightly less than predicted by the golden ratio theory. In this study, centrals had a value of 23%, laterals had 15.5 %, and canines had 11.5 %. According to Fayyad MA et al[22] and Calçada D et al[26], there may have been variations in the values obtained in this study that can be related to the subject's ethnic background. As a result, a modified form of the Golden percentage is widely used and is better recommended for usage as a geometric element of aesthetic grin design principles[27].

For the RED Proportion, the value was not constant across all subjects. The percentage of maxillary lateral incisors to the central incisors was between 66.34 and 69.97 %. The percentage of canine breadth to lateral incisor breadth ranges from 64.50 to 80.04 %. The ratio of lateral incisors to canines and between lateral incisors and central incisors is not constant in this study. The ratio rises as one moves further away from the midline.

The RED proportion suggested by Ward DH[28] (70%) is in agreement with the lateral incisor and by Fayyad MA et al[22] (66-78%), both the canine and lateral incisor are in harmony. Therefore, the RED proportion applied to natural dentition is not supported by the data in this study. According to a study by Maharjan et al.[30], the RED proportion only applies to the female Mongoloid population.

Further elaborative studies can be done with the incorporation of the race; extra-oral features, i.e., bizygomatic breadth, Preston Proportion[10], and M (Methot) proportion[29].

As a result, the values we determined for the golden % might be used as a standard to establish balanced proportions in anterior maxillary teeth[31]. Additionally, it is recommended that modifications be made based on buccal corridor breadth[32], age, sex, ethnicity[33,34], personality, and occupation of the individual rather than using either of the proposed extents as the only paradigm to determine the breadth of anterior maxillary teeth.

The limitation of the present study is that the calculation, as it was initially done manually for the calibration of the digital software, may involve human error.

Conclusion

According to the study's findings, the following conclusions were drawn:

1. In the study's participants, there was no evidence of the golden proportion between the perceived anterior maxillary teeth.
2. In the study's participants, there was no evidence of the RED proportion between the six anterior maxillary teeth.
3. The percentage ratio (11.5%:15.5%:23%: : 23%:15.5%:11.5%) was obtained in the subjects of this study.
4. The percentage was lower in canines (11.14% - 10.7%) in the 40 to 45 year old age group, suggesting that the canines wear out with age.
5. The percentage value of the central incisor was higher in females as compared to males.

Summary

Dental esthetics uses creativity and subjective approaches to create the illusion of beauty. Consequently, a deeper comprehension of aesthetic principles is required. Therefore, when restoring or replacing the anterior maxillary teeth, we must consider the unique dentofacial characteristics with the wide range of natural teeth proportions.

The ratios promoted may lead to an aesthetically beautiful outcome, but they are not the ratios observed in nature. Therefore, if one desires to employ the golden ratio as suggested by the listed writers, one should do so with the knowledge that the theory is not derived from nature and that it can only judge dominance and proportion, not symmetry[11].

As a result, when treating patients, all elements that tend to improve esthetics must be considered. Since dentists treat individuals rather than averages, we aim to create a smile that best complements the patient's overall facial features and offer the added benefit of enhanced dental health.

References

1. Schein SS, Langlois JH. Unattractive infant faces elicit negative affect from adults. Infant Behav Dev. 2015; 38:130-4.
2. Davis NC. Smile design. Dent Clin North Am. 2007;51(2):299-318.
3. Beder OE. Esthetics--an enigma. J Prosthet Dent. 1971;25(6):588-91.

4. Mahshid M, Khoshvaghti A, Varshosaz M, Vallaei N. Evaluation of "golden proportion" in individuals with an esthetic smile. J Esthet Restor Dent. 2004;16(3):185-92.
5. Lombardi RE. The principles of visual perception and their clinical application to denture esthetics. J Prosthet Dent. 1973;29(4):358-82.
6. Levin EI. Dental esthetics and the golden proportion. J Prosthet Dent. 1978;40(3):244-52.
7. Ricketts RM. The biologic significance of the divine proportion and Fibonacci series. Am J Orthod. 1982;81(5):351-70.
8. de Castro MV, Santos NC, Ricardo LH. Assessment of the "golden proportion" in agreeable smiles. Quintessence Int. 2006;37(8):597-604.
9. Wolfart S, Quaas AC. Subjective and objective perception of upper incisors. J of Oral Rehab 2006;33(7):489-95.
10. Preston JD. The golden proportion revisited. J Esthet Dent. 1993;5(6):247-5.
11. Rosenstiel S F, Ward D H, Rashid R G. Dentists' preferences of anterior tooth proportion – a web-based study. J Prosthodont 2000; 9: 123–136.
12. Ward DH. Proportional smile design using the recurring esthetic dental (red) proportion. Dent Clin North Am. 2001;45(1):143-54.
13. Snow SR. Esthetic smile analysis of maxillary anterior tooth breadth: the golden percentage. J Esthet Dent. 1999;11(4):177-84.
14. Dong JK, Jin TH, Cho HW, Oh SC. The esthetics of the smile: a review of some recent studies. Int J Prosthodont. 1999;12(1):9–19.
15. Morley J, Eubank J. Macroesthetic elements of smile design. J Am Dent Assoc. 2001;132(1):39-45.
16. Naylor CK. Esthetic treatment planning: the grid analysis system. J Esthet Restor Dent. 2002; 14(2):76-84.
17. Bishara SE, Jakobsen JR, Treder J, Nowak A. Arch breadth changes from 6 weeks to 45 years of age. Am J Orthod Dentofacial Orthop. 1997;111(4):401-9.
18. Yilmaz H, Bilgic F, Akinci Sozer O. Recent Photography Trends in Orthodontics. Turk J Orthod. 2016;28(4):113–21.
19. A guide to accreditation photography. American Academy of cosmetic dentistry 2013.
20. Patnaik, VVG, Singla RK, Bala S. Anatomy of 'A Beautiful Face & Smile.' J Anat. Soc. India 2003;52(1):74-80.
21. Beall AE. Can a new smile make you look more intelligent and successful? Dent Clin North Am. 2007;51(2):289–97.
22. Ali Fayyad M, Jamani KD, Agrabawi J. Geometric and mathematical proportions and their relations to maxillary anterior teeth. J Contemp Dent Pract. 2006;7(5):62–70.
23. Gillen RJ, Schwartz RS, Hilton TJ, Evans DB. An analysis of selected normative tooth proportions. International Journal of Prosthodontics. 1994; 7(5):410-417.
24. Hasanreisoglu U, Berksun S, Aras K, Arslan I. An analysis of maxillary anterior teeth: facial and dental proportions. J Prosthet Dent. 2005;94(6):530–8.
25. Basting RT, da Trindade R de CS, Flório FM. Comparative study of smile analysis by subjective and computerized methods. Oper Dent. 2006; 31(6):652–9.
26. Calçada D, Correia A, Araújo F. Anthropometric analysis of anterior maxillary teeth with digital

photography - a study in a Portuguese sample. Int J Esthet Dent. 2014; 9(3):370-80.

27. Kalia R. An analysis of the aesthetic proportions of anterior maxillary teeth in a UK population. British Dental Journal 2020; 228(6):449-455.
28. Ward DH. Proportional Smile Design: Using the Recurring Esthetic Dental Proportion to Correlate the Breadths and Lengths of the Maxillary Anterior Teeth with the Size of the Face. Dent Clin North Am. 2015;59(3):623–38.
29. Methot A. M Proportions. The new golden rules in dentistry. Canadian Journal of Cosmetic Dentistry 2006: 34-40.
30. Maharjan, A.; Joshi, S. Clinical evaluation of maxillary anterior teeth in relation to golden proportion, RED proportion and golden percentage. J. Nepal Health Res. Counc. 2018,16, 11–15.
31. Aziz M, Hossain MZ. Validity of mathematical proportions in maxillary anterior teeth among Bangladeshi population. APOS Trends Orthod 2017;7:41-8.
32. Jain S, Sharma P, Shetty D, Kumar A. Golden Proportion in Different Types of Smile: A Photographic Evaluation. Acta Scientific Dental Sciences 2019; 12(3):75-80.
33. Ahmed N, Halim MSB, Ghani AZ, Khan ZA, Abbasi MS, Jamayet BN, Alam MK. A 2D Photographic and 3D Digital Dental Model Analysis of Golden Percentage in Maxillary Anterior Teeth. Hindawi BioMed Res. Int. 2021, 6674400.
34. Ahmed N, Khalid S, Ghani AZ, Jamayet BN. Evaluation of golden percentage in natural maxillary anterior teeth breadth: A systematic review. J Prosthet Dent 2022;6:845.e1-945.e9
35. Castro MVM De, Santos NC, Ricardo LH. Assessment of the golden proportion in agreeable smiles. Quintessence Int 2006;37(8):597-604.