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(REVIEW ARTICLE)

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Golden proportion in smile design and maxillary anterior teeth: A review

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Abstract

The golden proportion is a well-known phenomenon and is considered a proportion often cited as frequently occurring in nature. It has been demonstrated by various artists, mathematicians, scientists and even philosophers. The golden proportion revolves around living beings and inactive creatures; even synthetic components and designs seem to follow the golden proportion. Human beings are genetically developed so that they can easily recognize the proportion as pleasurable because it demonstrates delicacy and is associated with the number science. The optimal proportion is associated directly with the golden proportion. The golden proportion is recognized as a standard rule for facial delicacy, and its application may aid in simplifying the diagnosis related to different dentofacial disorders. Various techniques were utilized to quantify the size and kind of teeth, such as the golden proportion. The primary aim of this review is to demonstrate the golden proportion phenomenon and evaluate the relationship between maxillary-anterior teeth and golden proportion.

Keywords: Golden proportion; Smile design; Maxillary anterior teeth; Teeth proportion

1. Introduction

The appearance of the face is an essential concern to almost everyone as it is a crucial feature of self-image. It is considered that any substance has a bad or good proportion. This magical proportion is also recognized as golden proportion, which is directly linked to beauty.

Although golden proportion is an extremely simple concept, attempts at its uses have shown to be compound and difficult to describe. Therefore, the description of the golden proportion cannot be completed without the Fibonacci Series, which is considered a supportive view of this phenomenon. In this series of numbers, every term is the aggregate of the earlier two terms as mentioned: 0 1 1 2 3 5 8 13 21… and so on.

The golden proportion or phi (φ) value can be yielded by dividing any two numbers close to each other, such as, 13/21= 0.169. The Fibonacci numbers can also be defined as an intrinsic order of numbers appropriate for living beings' growth, including almost every living creature [1].

Jefferson Y [2] also suggested the given phenomenon constituting a general rule for the facial delicacy built on the golden proportion: a universal rule is present for facial delicacy irrespective of religion, race, age and other factors. The standard rule is associated with a divine proportion. Further, the divine proportion is standard and interchangeable with delicacy.

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All living beings, including Homo sapiens, are encoded so that they can develop and follow the divine proportion. Abnormalities linked to the body and face result more because of the environmental factors than the factors related to genes. The given equation applies to all human beings irrespective of age, gender and other factors.

Golden proportion = facial delicacy = health of temporomandibular joint (TMJ) = mental health = physiological harmony = fertility = sum of health and wellness = life quality

Optimal facial proportions are standard and established on the golden proportion; for example, the face width is considered as a golden section of the entire face length, starting from the utmost of the head up to the base of the chin. Divergence from this standard proportion can lead to various health issues, e.g. individuals with facial hyperdivergence are susceptible to an event of upper respiratory tract obstruction. While individuals with short face types are susceptible to craniofacial pain events [2].

In 1978, Lewin EI documented the golden proportion application to dental beauty. He was the first to explain its narrative and mathematics and described the relationship between proportion, esthetical smile, and dentition [4].

Mack MR also described the need for managing the dentition following the divine proportion. He also asserted that the bottom one-third of the face remarkably changes the appearance of the face and informed about the possible complications developing in facial beauty when only dental mounted casts were utilized for diagnosis [6].

Jefferson Y demonstrated several golden proportion illustrations and edited pictures giving an optimal picture of the entire head. His contribution was also backed by cephalometric tracings [7].

In contrast to the golden proportion phenomenon, Lombardi and Ward DH explained the application of "continuous proportion' also called 'repeated ratio," which is formed between the width of maxillary anterior teeth and keeps on in the positioning of the leftover spaces and teeth. [8-10].

2. Golden proportion and maxillary anterior teeth

The Foundation of the golden proportion in dental aesthetics advanced proximate the distinct dimensions of maxillary anterior teeth when observed from the front [11]. Various studies examined the golden proportion in their local population. A study conducted in India found that the golden proportion was not constant regarding the relative width of the tooth [12].

Wolfart et al. [2], in a study, evaluated the personal judgment of some individuals about their dental delicacy and appearance and associated the outcomes with objective quantification of dentitions regarding the look of the maxillary tooth. Objective quantification was examined concerning four different parameters, including maxillary central incisors length, total length revealed during laughing and the width-to-length ratio between the ratio of central incisors and width of the maxillary anterior teeth. The study outcomes showed no significant differences in the objective quantification between different sexes. However, the level of satisfaction regarding the maxillary incisor's appearance, as mentioned by the golden standard, was greater for males than for females. Hence, it can be deduced that females can be more affected by emotions and may also have a greater critical observation of beauty standards [13].

Hasanreisoglu et al. [8] examined the different measures of anterior teeth, the incident of golden proportion and different dentofacial measurements utilizing full-face and maxillary-anterior teeth images and dental casts of upper arches of approximately 100 Turkish students. The outcomes revealed that the anterior teeth and canine dimensions are different in different genders; the presence of golden proportion wasn't proved; proportional relationships were found in females between the bizygomatic width and the width of the central incisor teeth, and the inter-canine distance and the inter-alar width [14].

Wolfart et al. [4], in another study, demonstrate the enchantment of standardized adjustments in incisor proportions utilizing computer-manipulated photographs. Standardized adjustments were developed in the central incisor's width-to-length ratios and also in teeth-to-teeth proportions betwixt the lateral and central incisor's width. The most charismatic one was width-to-length ratios within the 75-85% scale. In addition, tooth-to-tooth proportions revealed the best outcome regarding alluring appearance within 50-74% [15].

Pernia et al., in their study, evaluated the phenomenon of golden proportion in the anterior maxillary teeth. Several students were selected, and photographs were taken under optimized circumstances. The length and width of maxillary incisors were analyzed, and the ratio observed was compared with the golden standard. The outcomes showed

statistically significant variations between the width ratio of central and right lateral teeth with a golden proportion (P<0.001) [16].

In Saudi Arabia, a study was conducted to compare the dimensions of the maxillary anterior teeth to find their width and high ratio and achieved outcomes with no significant Variation between the central incisors and canines among both men and women [17]. Another study was conducted in Malaysia to analyze the variation between the golden proportion of 0.618 and maxillary anterior teeth width ratio and found significant differences between them [18].

3. Conclusion

Dental aesthetics is based on several factors and interdependencies between many aesthetically applicable factors. Hence, information related to golden proportions is helpful to clinicians in the aesthetic zone, but the difference in races should also be considered. The structure and size of the maxillary anterior teeth are the principal factors in esthetically accepted dent cases. In the conventional procedure, the extracted teeth were utilized to measure tooth sizes. However, photographs and dental casts are used to achieve this goal instead of extracted teeth. This study reviewed the golden proportion phenomenon, its application in dentistry and the relationship between maxillary-anterior teeth and golden proportion.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that there is no conflict of interest whatsoever.

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