Tooth Morphology and Aesthetics While Smiling in Accordance to Golden Proportion

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ABSTRACT

Background: The anterior teeth have a great impact on personality. This is true because the anterior teeth are visible while smiling and talking. Moreover the aesthetics demand of the patients for anterior teeth while these are getting restored by the dentist, the restorative procedure may become a bit tricky needing a more handful of art and science that may fulfill the patient’s desires. Thus it is sometimes more challenging to materialize the outcome that the patient actually wants. The Golden proportion is the ratio that is found to exist between the maxillary anterior teeth while looking from the front. This ratio has been assumed to be an ideal proportion between the maxillary anterior teeth. It may be helpful while restoring the anterior teeth and evaluation of esthetics.

Aim: To evaluate the existence of Golden proportions in outdoor patients coming at Nishtar Institute of Dentistry, Multan.

Methods: This study was carried out at Nishtar Institute of Dentistry, Multan. A total 70 patients were selected aged between 25 to 35 years. Twenty patients were male and 50 were female. The size of anterior maxillary teeth while smiling was measured with the help of manual caliper. All the measurements were noted in accordance to Golden proportions.

Results: Instead of golden proportion the ratio of 1.3 and 1.4 were more common i.e. 30% and 28.50% respectively among the patients.

Conclusion: Golden proportion is not a common finding in the study group involving the local population.

Key words: Golden proportion, Esthetics, Restorative intervention.

INTRODUCTION

The Holy Prophet (ﷺ) said: "When you smile to your brother’s face, it is charity". This is an authentic hadith. It is mentioned in Sunan al-Tirmidhi. There is enormous wisdom in the Holy Prophet’s (ﷺ) words. A beautiful smile is the most attractive feature in the face. However beauty is not absolute and is extremely subjective. A smile may be an emotional gift or blessing, not a material one. It is a sign of joy and pleasure. It is a gift whose recreation is received by the heart. Smiling aids our mental as well as physical health. The neurotransmitters like dopamine, endorphins and serotonin are all released when a smile given across the face¹. Indeed doctors have begun to incorporate smiling into their therapies. Smiling contributes to lowering blood pressure improved circulation and the beauty. It boosts the immune system. It works wherever stress and depression cause harm. Smiling relaxes us and improves our emotional stability. Aesthetics is derived from the Greek word aesthetikos that means to sense perception². It is the branch of philosophy concerned with the study of concepts like as beauty, taste, etc. Generally people are more conscious about their smile and thus aesthetic looks. If a patient has lost the anterior tooth/teeth, he is most conscious about his aesthetics or smile. In this way the patient may feel a psychological sense of being deprived and unable to talk or smile in an open way or according to desire. Thus a good aesthetics is somewhat a good smile that in turns dependent on the harmonious anterior teeth of face. It has also been observed that the patients that require the anterior teeth restorations take a keen interest in the outcome of the treatment and discuss all the procedure with the doctor before going to start as he uses all where withal. Thus it becomes somewhat more challenging to the doctor especially when the patient has missing or decayed teeth³. It all denotes that anterior teeth play a vital role in the personality and psychological attitude of the patient. An eloquent briefing to the patient about the treatment is sometimes more helpful. It is also to be noted that the congenitally missing laterals are accommodated making canines dissemble giving looks of laterals giving a good contribution to fetching aesthetics. The entire evocative treatment plan is to be is predetermined. If

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the patient is satisfied from the treatment outcome the dentist may have a good cynosure. The size and shape of maxillary anterior teeth is of utmost importance while considering the aesthetics and the smile\textsuperscript{5}.

The length and width both are important for considering the restoration. There has been mesiodistal dimension and the incisogingival one. Both are to be kept in mind as how to restore in the most acceptable fashion. The width of the tooth matters most than the other dimensions\textsuperscript{6}. The patient will be satisfied when all the restorative procedures coincide with the natural aesthetic looks. It was Mark Barr, an American mathematician who represented the Golden Ratio by using a Greek symbol $\Phi$. The ideal proportion for aesthetics and symmetry was found to be lie in the ratio of 0.618 to 1.0\textsuperscript{6}. The Golden proportion is a constant Ratio between the larger and the smaller teeth. This ratio is approximately 1.618:1. According to this ratio the smaller anterior tooth is nearly 62% of the adjacent larger tooth. This proportion was first introduced by Euclid. While smiling the anterior teeth are visible. So the people are more conscious about their anterior teeth than posterior ones. The lost anterior teeth may compromise the smile and aesthetics. The main factors responsible for the aesthetics are the lip line, angulations of teeth, facial symmetry, incisal line and shade of teeth\textsuperscript{7}. Special focus is also given when restoring these anterior teeth. A lot of restorative materials are available that are used to restore the lost tooth part for the conservation. Special consideration is given to match the excellence of aesthetics and a good harmony among all the anterior teeth. Since the aesthetics is of prime focus, the quality of restorative procedure as well as the material matters much. The objective of this study is to find out the natural proportions of the anterior teeth in comparison to golden proportion.

MATERIALS AND METHODS

This study was conducted at Nishtar Institute of Dentistry, Multan. Seventy patients were selected out of which fifty were females and twenty were males. Manual vernier caliper was used to measure the tooth dimensions in accordance with the Golden proportion. The width of maxillary incisors was made from the mesiodistal contact points. The width of canine was measured from the mesial contact point to the most distal point visible from front side. For the sake of good study finding and preventing any in accuracy, each measurement was taken thrice by the same operator. The width of larger central incisor was multiplied by 62 percent as compared to the smaller laterals and canines. The results were analyzed using SPSS version 20 at $\alpha=0.05$. Various ratios of golden proportions were measured on the basis of sex. Inclusion criteria was followed as (a) normal healthy teeth with no dental anomaly or tooth size discrepancy, (b) no periodontal disease or gum recession, (c) no spacing or crowding of teeth, (d) no restorative treatment performed in anterior teeth under consideration, (e) no attrition, erosion or abrasion present and (f) no missing anterior teeth.

RESULTS

Instead of golden proportion the ratio of 1.3 and 1.4 were more common i.e. 30% and 28.5% respectively. The ratio of 1.5 and 1.6 were found 11.42% and 18.57% respectively. Among the ratio of 1.6 it was observed that females had more ideal relation of golden proportion i.e., 22% as compared to the males having 10%. The overall proportion of Golden proportion was 18.57%. The prevalence of Golden proportion in females was 22% and in males it was 10%. In males the ratio of 1.4 was 35% as compared to females having 28.5%. However, in females the ratio of 1.3 was more common i.e. 30% which was equal to males (Table 1).

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1:1</td>
<td>1(5%)</td>
<td>-</td>
<td>1.42</td>
</tr>
<tr>
<td>1.2:1</td>
<td>2(10%)</td>
<td>5(10%)</td>
<td>10.0</td>
</tr>
<tr>
<td>1.3:1</td>
<td>6(30%)</td>
<td>15(30%)</td>
<td>30.0</td>
</tr>
<tr>
<td>1.4:1</td>
<td>7(35%)</td>
<td>13(26%)</td>
<td>28.5</td>
</tr>
<tr>
<td>1.5:1</td>
<td>2(10%)</td>
<td>6(12%)</td>
<td>11.42</td>
</tr>
<tr>
<td>1.6:1</td>
<td>2(10%)</td>
<td>11(22%)</td>
<td>18.57</td>
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</table>

DISCUSSION

The dental and facial aesthetics has usually been defined in terms of macro and micro elements. Macro aesthetics correlates the interrelationships between the face, lips, gingiva, and teeth and the perception that these relationships usually present. Micro aesthetics involves the aesthetics of an individual tooth and the perception that the color and form are appealing. The dentolabial gingival relationship, which is considered a part of oral aesthetics, has traditionally been where treatment planning is initiated. This process begins by determining ideal maxillary incisal edge placement in the jaw. This is accomplished by understanding the incisal edge position relative to several different landmarks in the oral cavity. The following things are considered preliminary to determine ideal incisal edge position (a) the exact placement of maxillary incisors looking aesthetically pleasing, (b) the need for any restorative or orthodontic intervention required for aesthetics (c)
the proper dimensions of tooth display statically as well as dynamically and (d) tooth size, length and arch size all in accordance to facial symmetry. The relationship among the teeth, or arch form, involves the golden proportion and position of tooth width. Although it is aesthetically pleasing yet it seldom reflects natural tooth proportions. According to a study, the natural portions demonstrate a lateral incisor between 60 to 70 percent of the width of the central incisor, which is larger than the golden proportion. However a rule guiding proportion is that the canine and all teeth distal should be perceived to occupy less visual space as we look from the frontal aspect. Another rule to help maintain proportions throughout the arch is 1-2-3-4-5; the lateral is 2/3 of the central and the canine is 4/5 of the lateral, with some latitude within those spaces. Finally, contact areas can be moved restoratively that may coincide the aesthetics outcomes.

According to a study, the golden proportion was not found between perceived mesiodistal widths of maxillary central and lateral incisors and nor between perceived mesiodistal widths of maxillary lateral incisors and canines. In the majority of subjects, the width-to-height ratio of maxillary central incisor was within 75%-80%. Moreover there were no statistically significant differences in maxillary anterior teeth proportions between males and females. These results may serve as guidelines for treatment planning in restorative dentistry and periodontal surgery. The aim of this study was to determine the prevalence of Golden proportion and recurring aesthetic dental proportions in individuals with attractive smiles attending the OPD at Nishtar Institute of Dentistry Multan. Seventy patients with natural dentition were selected out of which 20 were males and 50 were females aged 25-35.

The smiles were analysed to evaluate the prevalence of Golden Proportion and obtained data was statistically analyzed. In a study of evaluation Golden Proportion, Recurring Aesthetic dental proportion (RED) proportion was present in 6.6% of population as opposed to golden proportion which was found in 0.6% of population. It was found that 70% RED was more prevalent than Golden Proportion in attractive as well as unattractive smiles. Our study demonstrates that the Golden proportion is not common in the local population. It was found to be more common in females than males attending the outdoor department of dental hospital.

It is also to be noted that the tooth, arch size and the inter-arch relationships are all specific for a certain population thus having predilection for the certain population and the gender. In this way the Golden proportion may be variable. According to the research of Hasanreisoglu et al about the width of anterior teeth among Turkish population, it was found that the dimensions of the central incisors and canines had certain variations by gender without the Golden proportion.

There has been no evidence pointing out that the golden proportion should be considered the ideal aesthetic standard when creating space for the replacement of the missing lateral incisors. According to Gillen et al the golden proportion was rarely observed in his study group with 54 individuals only using dental casts to measure Golden proportion. Other studies have also shown that the frequency of the golden proportion in smiles was quite low. The study of Woelfel also showed that Golden Proportion had not always been common phenomena and variations had been frequently observed. On the basis of results obtained in our study group and on the results from the different researches. We may conclude that Golden Proportion should not be considered and ideal parameter for every case but rather a range. The work of Ahmed revealed that golden ratio can be a good starting point in order to obtain aesthetically acceptable results, however any ratio of 0.6-0.8 may be aesthetically acceptable. The golden ratio can be helpful to achieve aesthetic restorations of the maxillary central and lateral incisors. However, the golden ratio between the perceived widths of the maxillary lateral incisors to the canines does not seem to be decisive for an attractive smile and other factors should be considered. According to de Castro et al the golden proportion was not often found in adjacent teeth shown in smiles in the sample studied. Works of Mahshid et al also demonstrated that the golden proportion is not a common factor in aesthetic smiles.

CONCLUSION
Golden proportion is not a common finding in the study group. Although the Golden proportion is helpful for the felicity of the aesthetic restorations yet it should never be considered as a part and parcel for every aesthetic outcome. It might be good for one scenario but may remain superfluous for the next one. It would be better to think the Golden proportion as a range which might be adjusted according to both the patient’s as well as doctor’s judgment.

REFERENCES