Original Research Paper

Dental Science

ASSESSMENT OF GOLDEN PROPORTION AND GOLDEN STANDARD IN ZULFI POPULATION, KSA.

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ABSTRACT

Aim: To evaluate the existence of golden proportion and golden standard in Zulfi population.
Materials and Methods: Dental casts of the 350 maxillary arches was selected. The dimensions and the perceived width of anterior teeth were measured. The perceived width ratio was compared with the golden proportion of 0.618. Golden standard was calculated and compared with standard value (80%). The data was analyzed by SPSS version 21.
Results: There was statistically significant difference in mean perceived width of maxillary lateral incisor to central incisor and canine to lateral incisor. The mean width –to-height ratio was 80.1429 which were statistically significant from golden standard (80%).
Conclusion: Ideal golden proportion (0.618) and golden standard (80%) does not exists is Zulfi population.

KEYWORDS : digital caliper, golden proportion, golden standard, perceived width.

Introduction:

Orthodontics is a branch of dentistry which is concerned with correcting or improving the position of teeth and correcting any malocclusion and enhancing patient's facial esthetics. The size and form of the maxillary anterior teeth are important for dental esthetics.1 Many theories have been introduced regarding the size and form of maxillary teeth like golden proportion and golden standard.

Lombardi was amongst the pioneers who suggested the application of the golden proportion in dentistry. Golden proportion is approximately 0.618. It means that the visible width of lateral incisor is 62% (0.618) of a central incisor and the visible width of canine is 62% (0.618) of a lateral incisor.2 In order to achieve excellent aesthetics some authors have presented guidelines regarding anterior aesthetics which include recommendations for the optimal anterior tooth proportions and tooth lengths. There are golden standard values concerning the optimal width- to-length ratio of the upper central incisors.3, 4

In orthodontics treatment plan is decided by considering certain values or numbers, which were determined by studies conducted on specific populations. Hence it is not fair to apply the same values for other populations because there may be differences in opinion in the perception of esthetics among others. The golden proportion and golden standard were determined by studies on foreign populations.5, 6 Hence it is not necessary that it will be suitable for Zulfi population also.

Materials and Methods:

Dental casts of the 350 maxillary arches were be made from the patient's visiting college of dentistry, Zulfi. The inclusion criteria were presence of all anterior teeth without any gingival or periodontal conditions that alter healthy tissue-to-tooth relationship, absence of interdental spacing or crowding, no restorations on anterior teeth and no prior history of orthodontic or cosmetic treatment. The exclusion criteria were presence of crowding, tooth structure loss due to of attrition, fracture or caries and problems which affect the dentition and face.

The instruments used for making the impressions and preparing

the casts were perforated metal stock trays, rubber bowls, curved metal spatula, , alginate impression material, straight metal spatula, dental stone and dental plaster..

The dimensions of the anterior teeth and the perceived width of anterior teeth viewed from front were measured using a digital caliper read to the nearest 0.01 mm. Evaluations regarding the occurrence of the golden proportion were conducted by drawing of grids that obtained by placing the casts on a flat surface and drawing vertical lines representing the perceived mesiodistal widths of the teeth. The golden proportion grid is shown in (Figure 1). Measurements were done for the spaces in the grids using the digital caliper as shown in (Figure2). All measurements were performed by the three researchers working independently and the average of these measurements was taken; if the readings differed by more than 0.1 mm, the procedure was repeated.

The golden proportion for each subject was assessed by multiplying the width of the larger component by 62% and compared the width of the smaller component for proportion to be analyzed. The width of central incisor was multiplied by 62% and compared with the width of the adjacent lateral incisor. Similarly the width of the lateral incisor and canine was evaluated for golden proportion.

The perceived width ratio of lateral to central incisor and canine to lateral incisor was compared with golden proportion of 0.618. Similarly tooth width to height (golden standard) will be calculated and compared with standard value (75- 80%). The data obtained were tabulated and subjected to statistical analysis using Student's t-test with level of significance p 0.05. The data will be analyzed by Statistical Package for Social Science (SPSS) version 21.

Figure 1

Figure 2

Results

The results of this study showed that perceived right maxillary lateral incisor to central incisor width ratio was 0.6196, right canine to lateral incisor was 0.6202, left lateral incisor to central incisor width ratio was 0.6198 and left canine to lateral incisor was 0.6196. There was statistically significant difference in mean perceived width of maxillary right and left lateral incisor to central incisor and right and left canine to lateral incisor as compared to golden proportion (0.618) (Table 1).

The mean width –to-height ratio was 80.1429. When compared from standard (80%); this difference was found to be statistically significant (Table 2).

Table 1: Comparison between the present study result and golden proportion.

Teeth	Mean	SD	P value
Right Lateral incisor to central incisor	0.6196	0.0151	0.047
Ideal golden proportion	0.618		
Right Canine to lateral incisor	0.6202	0.0125	0.001
Ideal golden proportion	0.618		
Left Lateral incisor to central incisor	0.6198	0.0150	0.023
Ideal golden proportion	0.618		
Left Canine to lateral incisor	0.6196	0.0122	0.016
Ideal golden proportion	0.618		

Table 2: Comparison of tooth width-to- height ratio for maxillary central incisor with ideal golden standard (80%).

Central incisor	Mean %	SD %	P value
Present study	80.1429	1.2622	0.035
Ideal golden standard	80%		

Discussion

In the literature the golden proportion has been proposed as one of the useful application for achieving proportion and esthetics. Golden proportion in dentistry mathematically determines the ratio between a larger and shorter length with the larger length equivalent to phi.7 The golden proportion is the ratio (1.618: 1.0) between the dimensions a larger and a smaller length. There are both for and against opinion for the use of these golden proportions in dentistry. In 1978; Levin8 observed the existence of golden proportion between the width of central incisor, lateral incisor and the canine. Preston9 concluded that only 17% of his study samples had golden proportion between the width of the maxillary central and lateral incisors whereas Lombardi2 recommended a repeated ratio concept in contrast to golden proportion.

The results of our study showed that golden proportion does not exist in Zulfi population. The ideal golden proportion is 0.618(0.62). In our study the perceived right lateral incisor to central incisor width ratio is 0.6196 (SD 0.0151) and the perceived left lateral incisor to central incisor width ratio is 0.6198 (SD 0.0150). The difference in right and left perceived mesiodistal width with the standard golden proportion (0.618) is found to be statistically significant (p 0.05). There was statistically significant difference (p 0.05) between perceived width ratio of right and left canine to lateral incisor (0.6202; SD 0.024 and 0. 6196; SD 0.0122) and golden proportion 0.618 (Table 1). Our results are in agreement with studies conducted by George and Bhat7, V. Shrinivasan Murthy, Minoomashid et al and Fayyad et al .10- 12 They concluded that golden proportion was not present in the natural dentition. Our results are in contradiction to the results of Snow who had recommended the application of golden proportion in diagnosis and development of various aesthetic factors such as dominance, proportion and symmetry.13

The results of our study showed width-to-height ratio higher than other studies conducted by Wolfart et al3, Hasanresioglu et al, and Parnia et al.14, 15 The difference between ideal width-to-height ratio (80%) and our result (80.1429 %; SD 1.2622) was found to be statistically significant(p 0.05). These differences might be due to differences in racial characteristics. Our results coincide with the studies conducted by Sterrett et al.16

Geometrical or mathematical relationship between teeth is an important determinant to achieve an esthetic restorative result.17, 18 The results of our study showed that each individual is unique and the application of a generalized relationship is not accurate. Hence it is inappropriate to anticipate for every patient to possess this precise relationship because human are individuals with unique facial and dental features. Being one of the micro esthetics factors of esthetics it is not a major consideration whereas the other macro esthetic factors and principles play a significant role in determining esthetics.14 In dentistry; literature suggests using golden proportions and golden standard to develops pleasing proportions, the results of the present study show that both golden proportion and golden standard did not exist in maxillary anterior teeth of Zulfi population.

ConclusionThe golden proportion (0.618) and golden standard (80%) does not exists is Zulfi population. Hence it is important to consider the dento-facial specificities of each individual and the various natural teeth proportions during restoration or replacement of the maxillary anterior teeth.

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