Analyzing Facial Esthetic and Divine Proportion from Orthodontics Perspective: The enigma of Facial Beauty

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Abstract

Introduction: In recent years, the golden proportions have been evaluated by various researchers in the general population and orthodontic patients to establish their correlation with facial attractiveness and esthetics, but with conflicting results.

Objective: The present study aimed to analyze the frontal facial golden proportions of young adults, an attractive group, and two malocclusion groups. Our null hypothesis stated that the golden proportions of attractive females were analogous with or closer to the golden number than those with an established malocclusion.

Materials and Methods: Frontal facial photographs of 100 participants were scoredfor facial attractiveness by 10 dental specialists. Thirty females with scores greater than themedian score of 48 formed the attractive group. Thirteen females with Class I malocclusionand 15 females with Class II division 1 malocclusion formed the two malocclusion groups. Tenlandmarks and 19 golden proportions were calculated for all subjects. One-way ANOVA was used to analyze the differences in golden proportions betweenthe attractive and malocclusion groups.

Results: Significant differences were observed for 10 proportions (P < 0.04 to < 0.0001). Onevertical proportion showed significant differences in both subgroups; attractive versus Class Iand attractive versus Class II division 1; while one vertical and all transverse proportion showedsignificant differences only in the Attractive versus Class II division 1 subgroup. The average values of these proportions varied both toward and away from the golden number for both attractiveand malocclusion groups.

Conclusion: Facial proportions of the attractive females were significantly different from thosewith malocclusion but did not show a constant trend of being closer to the golden number. Furthermore, the golden proportions were not analogous to the facial esthetics of attractive females.

Keywords: Facial esthetics, facial proportions, golden proportions, malocclusion, phi

Introduction

Our perception of beauty is related to attractiveness and facial attractiveness, in particular, is an important physical attribute. An attractive facial appearance invites positive social responses, which have a profound effect on a person's self-esteem and capacity for social adjustment.[1]

The aesthetic aspects of the face have become a primary area of focus in our society as people search for ways to improve their facial beauty in the present and over the long term. Facial cosmetic surgery involving skin tightening, widening of the eyes and augmentation of the lips are particularly common.[2]

Physical beauty has been one of the major concerns of mankind, and it is a difficult concept to define due to the subjectivity of the observer as well as the fact that this is a concept in constant evolution or change in function of the different eras and cultures, fashions, etc.[3]

Improvement of facial appearance is the most frequently reported subjective reason for seeking orthodontic treatment.[4]

The prehistoric man rarely described facial features in the human representations which he had carved in stone or painted on a rock.[5]

Artworks became more refined to depict facial features, proportions and resemblances in the ancient civilizations of Egypt, China, and Greece. Egyptian artists used simplified grid systems to draw figures to ideal proportions.[5]

Ancient Greece formalized the study of beauty and developed intricate formulas for constructing human and godly representations.[5]

The renaissance brought one of the most important axioms of facial esthetics, the golden proportion, into the limelight. Initially described by Euclid, it was later termed the divine proportion by the mathematician Luca Pacioli in the year 1509. It simply stated a geometrical proportion in which, a line AB was divided at a point C in such a way that AB/AC=AC/CB. Fibonacci later calculated the golden proportion mathematically and represented it by the symbol Φ (Phi); derived from the name of the Greek sculptor Phidias, the proportion had a calculated value of 1.618 or 0.618 and was denoted as the golden number.[6]

Facial harmony in orthodontics is determined by the morphologic relationships and proportions of the nose, lips, and chin.[7]

In orthodontics, Ricketts was among the first to study the face and describe the importance of divine proportions. He formulated the proportions and stated that organisms, including humans that conformed to the divine proportion, were not only beautiful but also biologically healthy.[8]

Jefferson established a biological equation for all humans regardless of race, age, and sex; he concluded that "divine proportion = facial beauty = temporomandibular Joint health = psychologic health = physiologic harmony = fertility = total health and wellness = quality of life.[9]

Geometric morphometrics, also known as statistical shape analysis, might be more valid for describing biological shape than angles and proportions and is widely used in other branches of biological science. In statistical terminology, the rotation, translation, and scale parameters that are not of scientific interest are known as nuisance parameters. Morphometrics can help to eliminate the interference of nuisance parameters. Furthermore, morphometrics allows the integration of distinct information present in photographs.[10]

Orthodontists typically use image analysis methods to examine attractiveness. A standard orthodontic setoff photograph includes frontal smiling, lateral, and frontal views; these are the most common records used to establish a treatment plan, compare changes after treatment, and evaluate treatment results.[11]

Malocclusions influence the perception of attractiveness, intelligence, personality, and behaviours.[12]

Individuals with a normal occlusion are considered more attractive, intelligent, pleasant and extroverted; anterior crossbites lead to negative perceptions, and people with several diastemas are seen as the least conscientious and agreeable.[13]

A recent study of the effect of teeth arrangement on human resources personnel showed that people with ideal smiles were considered smarter and more appropriate for the job.[14]

Pallett et al.,even found a ''new golden proportion,'' according to which individual attractiveness is optimized when the vertical distance between the eyes and the mouth is approximately 36% of the face's length and the horizontal distance between the eyes and the mouth is approximately 46% of the face's width.[15]

As facial soft tissue analyses continue to attain more importance in orthodontic treatment planning, it seemed pertinent to determine the importance of golden proportions in the diagnosis and classification of the malocclusion.

The present study analyzed the golden proportions for two groups of young adults, the attractive group, and the malocclusion group.

Our null hypothesis stated that the golden proportions for attractiveness were analogous with or closer to the golden number contrary to those with established malocclusion.

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Aim of the Investigation:

a. To analyze the frontal facial golden proportions of young adult groups.

b. To establish the normal range of measurements of the craniofacial complex.

Research Objectives

1. *Primary objective*

a. To study and Comparison of the Vertical and Horizontal Facial proportions in the two groups.

2. *Specific Objectives*

a. To describe the socio-demographic characteristics of the study population.

b. Evaluated the golden proportions in the general population and established their correlation with facial attractiveness and esthetics.

Research Methodology

Research Hypotheses

It was hypothesized that; facial proportions will show a constant trend of being closer to the golden number.

Research design

The design of this study was Descriptive and cross-sectional. The convenience sampling technique was used for this study.

Sample size[16]

Formula

$$\frac{z^2 X \, p \, (1 - p)}{e^2} \frac{1 + z^2 X \, p \, (1 - p)}{e^2 N}$$

N = population size, e = Margin of error (percentage in decimal form), z = z-score

For the present study, the sample should be sufficiently large to represent the population yet not so large that the data collection and analysis are prohibitively difficult. At a 95% confidence interval and a 5% confidence level, the sample size calculated was 100.

Ethical Consideration

Participants were given verbal and written informed consent acknowledging the receipt of information and confirming their willingness to participate in the study.

All information was collected and analyzed confidentially.

Participation was voluntary, and the participants had the right to withdraw from the study for any reason at any time.

Trial design and study setting and Study Period

The study was conducted at Vellore (Tamil Nadu State). The targeted populationwas conducted at two different settings, a private hospital, and a private dental clinic, which had agreed to participate in the survey, and was selected.

The study period was from Jan 2022 to Feb 2022.

Assessors

The purposive sample was composed of (n=100) participantsaged 18-25 years (mean age 21.6 ± 2.2) without dental knowledge or experience and was of Caucasian origin.

They were divided into 2 groups Skeletal class I (n=50), skeletal class II div 1 (n=50) according to ANB, U1-SN angles. Before the assessment, the assessors filled out a demographic questionnaire. Six experts did the content validity process.

The Inclusion criteria

a. A straight profile with a mesocephalic face type.

b. Absence of mentalis hyperactivity with an interlabial gap less than 1mm.

c. Ages 15-25 years old at the time the photograph was taken.

d. ANB angle value of 0° to 10°.

e. No apparent asymmetries, congenital anomaly, or another known syndrome.

f. No obvious vertical disproportions of the lower face.

g. No previous plastic or maxillofacial surgery or orthodontic treatment.

The Exclusion criteria

a. Age 25 years old and more.

b. Cavities or fillings on the anterior maxillary teeth.

c. Cosmetic treatment of the facial region.

d. Craniofacial anomalies, Craniofacial trauma, surgery.

e. Gingivitis or periodontal disease is evident when smiling.

f. Previous history of developmental and neurological defects of the facial region.

Research Tool (Landmarks)[17]

This study protocol was developed as per the Standard Protocol Items: Recommendations for Geometric Morphometrics

All photographs were standardized by using a tripod and camera with a constant focal length of 85 mm and aperture at f/5.6. The tripodassisted in gaining stability and the correct height of the camera according to the subject's body height. It also ensured the correct horizontal position of the optical axis of the lens.

A single external flash was placed one foot behind and in line with the lens of the camera and white background was used to get maximum illumination. The use of a slave flash unit allowed synchronization of the flash and camera viaa wireless trigger, attached to the camera's hot shoe port.

The subjects stood bare feet at 2 m from the camera on a line marked on the floor. They were instructed to look directly into and in line with the optical axis of the lens such that the inter-pupillary line was parallel to the floor. An inch ruler was hung down vertically with a plumb line held by a thick thread alongside the subject, the formerly allowed standardization of measurements while the plumb line indicated the true vertical.

Geometric Morphometrics[18]

Geometric morphometrics is an approach that studies shape using Cartesian landmark and semi landmark coordinates that can capture morphologically distinct shape variables.

The photographs were analyzed using planmeca (Planmeca Romexis® Cephalometric Analysis software) cephalometric software program for the Windows operating system. The program calculated the measurements once all the landmarks were manually identified in the software by the same operator.[19]

Nineteen putative golden proportions were calculated from these measurements based on landmarks

The visual analogue scale (VAS) scoring system 20 was used to score the frontal facial photographs of the initial sample for facial attractiveness on a scale of 0–10. All photographs were printed (9 cm × 13 cm) and mounted on a display board. They were individually assessed by 6 dental specialists, including 3 Pedodontists and 3 Orthodontists, for not more than 15 min each.

General guidelines were given to all evaluators for scoring the photographs in a nonbiased manner, taking into consideration facial symmetry, structural balance and harmony, facial proportions, and cosmetic appeal.

Statistical analysis[20]

The statistical analysis was done using Statistical Package for Social Sciences (IBM SPSS Statistical analysis software) version 25.0. One-Way ANOVA was applied to study the effect of malocclusion on measurements in the 2 groups,

The one-sample z-test was used to test whether the facial proportions were similar to the golden

Table 1: Social-demographic variables of respondents

Individual scenario			
		ANOVA (Inference)	
Variables	Respondents	Frequency (n)	Response rate (%)
Total number of respondents			
Gender	Male	50	100
	Female	50	100
Age group	18-25 years	Mean ± SD Comparisons	21.6 ± 2.2

Data Source
•   Fieldwork, 2021

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Table 2: Comparison of the Vertical and Horizontal Facial proportions in the two groups.

Variables (Facial proportions)	Individual scenario					
	Class I (n=50)			Class II div 1 (n=50)		
	ANOVA (Inference)			ANOVA (Inference)		
	Mean ± SD Comparisons	Z-score Comparisons	Inferential Statistics	Mean ± SD Comparisons	Z-score Comparisons	Inferential Statistics
	Vertical proportions			Vertical proportions		
FH: NH	2.18 ± 0.014	3391.48	p< 0.0001 HS*	2.13 ± 0.014	3395.03	p< 0.0001 HS*
FH: MH	1.92 ± 0.020	2404	p< 0.0001 HS*	1.89 ± 0.035	1374.57	p< 0.0001 HS*
FH: UFH	1.41 ± 0.022	2208.03	p< 0.0001 HS*	1.48 ± 0.020	2418.5	p< 0.0001 HS*
UFH: MFH	1.63 ± 0.011	4357.65	p< 0.0001 HS*	1.63 ± 0.011	4397.27	p< 0.0001 HS*
UFH: LFH	1.51 ± 0.011	4368.46	p< 0.0001 HS*	1.51 ± 0.011	4408.18	p< 0.0001 HS*
FFH: UFH	1.71 ± 0.023	2099.56	p< 0.0001 HS*	1.67 ± 0.0172	2809.8	p< 0.0001 HS*
FFH: MLFH	1.69 ± 0.011	4352.25	p< 0.0001 HS*	1.69 ± 0.11	4391.81	p< 0.0001 HS*
NH: ULH	0.90 ± 0.017	2796.51	p< 0.0001 HS*	0.93 ± 0.0172	2794.76	p< 0.0001 HS*
MFH: NH	1.93 ± 0.014	3409.21	p< 0.0001 HS*	1.93 ± 0.014	3433.57	p< 0.0001 HS*
MFH: MH	1.70 ± 0.011	4351.35	p< 0.0001 HS*	1.72 ± 0.0172	2806.97	p< 0.0001 HS*
FH: MLFH	1.40 ± 0.017	2825.58	p< 0.0001 HS*	1.45 ± 0.014	3467.85	p< 0.0001 HS*
MFH: MLFH	1.58 ± 0.010	4794.05	p< 0.0001 HS*	1.59 ± 0.011	4400.90	p< 0.0001 HS*
LFH: MLFH	1.48 ± 0.020	2426	p< 0.0001 HS*	1.48 ± 0.020	2426	p< 0.0001 HS*
NH: LFH	1.93 ± 0.47	1022.76	p< 0.0001 HS*	1.93 ± 0.478	100.56	p< 0.0001 HS*
MH: LFH	1.81 ± 0.017	2834.70	p< 0.0001 HS*	1.82 ± 0.011	4380	p< 0.0001 HS*
MH: ULH	0.126 ± 0.011	4390.99	p< 0.0001 HS*	1.22 ± 0.011	4434.54	p< 0.0001 HS*
	Horizontal proportions			Horizontal proportions		
FW: ICW	1.43 ± 0.011	4375.67	p< 0.0001 HS*	1.40 ± 0.011	4418.18	p< 0.0001 HS*
ICW: SW	1.89 ± 0.035	1374.57	p< 0.0001 HS*	2.04 ± 0.0081	5920.98	p< 0.0001 HS*
SW: NW	1.32 ± 0.011	4385.58	p< 0.0001 HS*	1.20 ± 0.011	4436.36	p< 0.0001 HS*

Citation

- Johnston DJ, Hunt O, Johnston CD, Burden DJ, Stevenson M, Hepper P.The influence of lower face vertical proportion on facial attractiveness. Eur J Orthod 2005; 27:349-54.

Data Source

- Fieldwork, 2021

Note

- Significance level p< 0.0001, *Significant; HS: Highly significant

proportion at the confidence level of 95% and p-value of 0.05 for a significant difference. Descriptive statistics (means and SD) were calculated for all variables.

Mean measurements of proportions were converted to percentages, assuming that the divine proportion was 100%.

Results

The results are presented concerning the following:

1. Description of the demographic characteristics.

2. Comparison of the Vertical and Horizontal Facial proportions in the two groups.

3. Analysis and comparison of Facial proportions with the Golden proportion (Attractive).

There were 100 respondents, who met the inclusion criteria for the study. They were drawn from the private clinic and were mainly of low to middle socioeconomic status. The sample consisted of 50 female and 50 male respondents representing 100% and 100% of the sample respectively. The
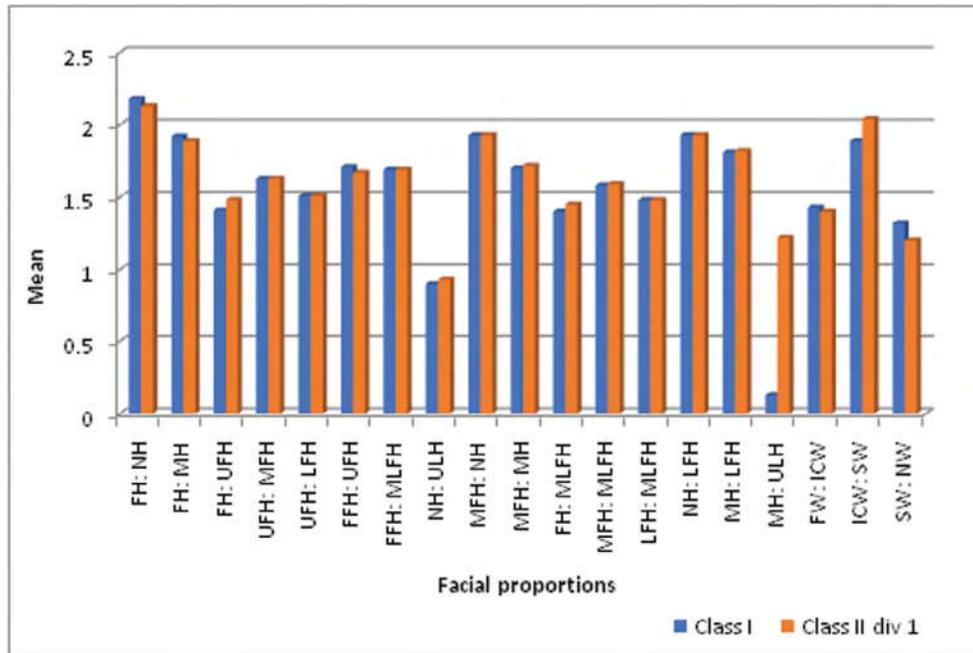
Graph 1: Comparison of the Vertical and Horizontal Facial proportions in the two groups.
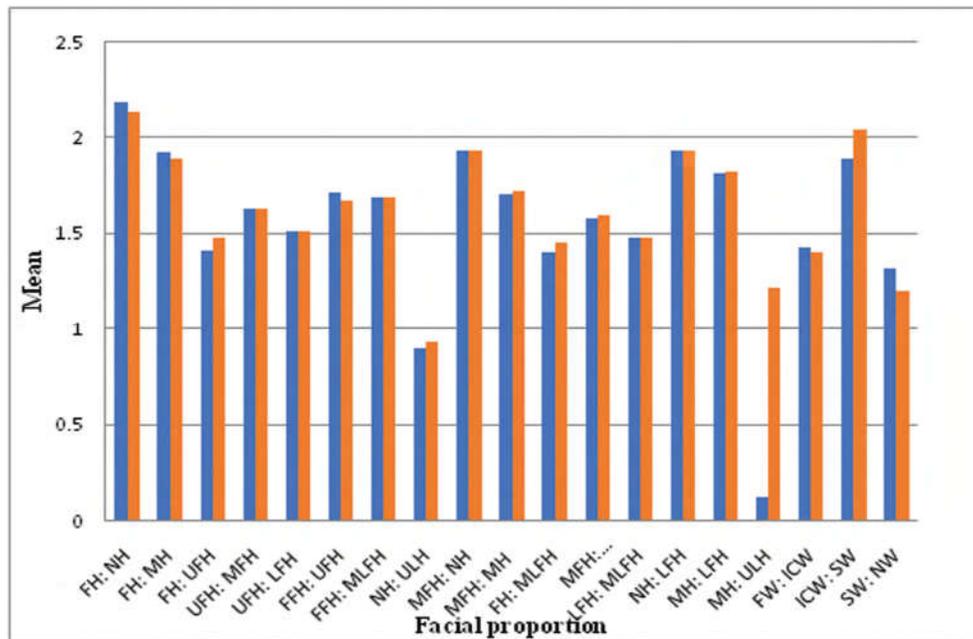
Graph 2: Analysis and comparison of Facial proportions with the Golden proportion (Attractive)

mean age was 21.6 yearswith a standard deviation was 2.2.

Statistical analysis of the proportions in class I and class II div 1 group revealed significant differences in the proportions between the 2 groups. On further analysis, to study the effect of malocclusion: The value of Vertical Golden proportions and Horizontal Golden proportions showed there were statistically highly significant differences Comparison class I vs class II div 1.

Statistical analysis of the golden proportions in the attractive and malocclusion groups revealed highly significant differences for the proportions FH: NH; FH: MH; FH: UFH; UFH: MFH; UFH: LFH; FFH: UFH; FFH: MLFH; NH: ULH; MFH: NH; MFH: MH; FH: MLFH; MFH: MLFH; LFH: MLFH; NH: LFH; MH: LFH; MH: ULH; FW: ICW; ICW: SW; SW: NW: P < 0.0001

On further analysisproportions SW: NW; MFH: MLFH; UFH: MFH showed highly significant

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Table 3: Analysis and comparison of Facial proportions with the Golden proportion (attractive)

Variables (Facial proportions)	Individual scenario					
	Class I (n=50)			Class II div 1 (n=50)		
	ANOVA (Inference)			ANOVA (Inference)		
	Mean ± SD Comparisons	Attractive 1.618 Mean difference (%)	Inferential Statistics	Mean ± SD Comparisons	Attractive 1.618 Mean difference (%)	Inferential Statistics
	Vertical Golden proportions			Vertical Golden proportions		
FH: NH	2.18 ± 0.014	0.56 (134.7)	p=0.0001 SS*	2.13 ± 0.014	0.512 (131.6)	p=0.0001 SS*
FH: MH	1.92 ± 0.020	0.69 (118.6)	p= 0.0001 SS*	1.89 ± 0.035	0.572 (116.8)	p=0.0001 SS*
FH: UFH	1.41 ± 0.022	1.51 (87.1)	p=0.0001 SS*	1.48 ± 0.020	0.138 (91.4)	p=0.0001 SS*
UFH: MFH	1.63 ± 0.011	0.02 (100.7)	p< 0.0001 HS*	1.63 ± 0.011	0.02 (100.7)	p< 0.0001 HS*
UFH: LFH	1.51 ± 0.011	0.10 (93.3)	p=0.0001 SS*	1.51 ± 0.011	0.10 (93.3)	p=0.0001 SS*
FFH: UFH	1.71 ± 0.023	0.092 (105.6)	p= 0.0001 SS*	1.67 ± 0.0172	0.052 (103.2)	p=0.0001 SS*
FFH: MLFH	1.69 ± 0.011	0.072 (104.4)	p= 0.0001 SS*	1.69 ± 0.11	0.072 (104.4)	p=0.0001 SS*
NH: ULH	0.90 ± 0.017	0.718 (55.6)	p= 0.0001 SS*	0.93 ± 0.0172	1.312 (57.4	p=0.0001 SS*
MFH: NH	1.93 ± 0.014	0.312 (8.38)	p< 0.0001 SS*	1.93 ± 0.014	0.312 (119.2)	p=0.0001 SS*
MFH: MH	1.70 ± 0.011	0.082 (119.2)	p< 0.0001 HS*	1.72 ± 0.0172	0.102 (106.3)	p=0.0001 SS*
FH: MLFH	1.40 ± 0.017	0.218 (86.5)	p< 0.0001 SS*	1.45 ± 0.014	0.168 (89.6	p=0.0001 SS*
MFH: MLFH	1.58 ± 0.010	0.0 38 (97.6)	p< 0.0001 HS*	1.59 ± 0.011	0.028(98.2	p< 0.0001 HS*
LFH: MLFH	1.48 ± 0.020	0.138 (91.4)	p=0.0001 SS*	1.48 ± 0.020	0.138 (91.4)	p=0.0001 SS*
NH: LFH	1.93 ± 0.47	0.312 (119.2)	p= 0.0001 SS*	1.93 ± 0.478	0.312 (119.2)	p=0.0001 SS*
MH: LFH	1.81 ± 0.017	0.192 (111.8)	p= 0.0001 SS*	1.82 ± 0.011	0.202 (112.4	p=0.0001 SS*
MH: ULH	0.126 ± 0.011	0.492 (7.78)	p= 0.0001 SS*	1.22 ± 0.011	0.312 (75.4	p=0.0001 SS*
	Horizontal Golden proportions			Horizontal Golden proportions		
FW: ICW	1.43 ± 0.011	0.188 (88.3)	p=0.0001 SS*	1.40 ± 0.011	0.218 (86.5)	p=0.0001 SS*
ICW: SW	1.89 ± 0.035	0.27 (116.8)	p=0.0001 SS*	2.04 ± 0.0081	0.422 (126)	p=0.0001 SS*
SW: NW	1.32 ± 0.011		p< 0.0001 HS*	1.20 ± 0.011		p< 0.0001 HS*
For ref	Mean /1.618=%					

Citation

- Qamar Ibrahem and Hassan Farh. Evaluation of the golden proportion in facial soft tissues of class I and II malocclusion patients. International Journal of Applied Dental Sciences 2020; 6(1): 161-166.

One-sample t-test with a test value =1.618 (i.e., the golden proportion), *: statistically significant differences.

Data Source

- Field work, 2021

Note: Significance level p< 0.0001, *Significant; HS: Highly significant; SS: Statistically significant

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Table 4: Description of Facial planes

Facial heights and widths	Description
Forehead height	Distance between Tr horizontal to CR-CL Plane
Nasal height	Distance between CR-CL plane to AR-AL plane
Upper facial height	Distance between Tr horizontal to AR-AL plane
Middle facial height	Distance between CR-CL plane to LcR-LcL plane
Lower facial height	Distance between AR-AL plane to Me horizontal
Upper lip height	Distance between AR-AL plane to LcR-LcL plane
Facial width	Distance between FwR vertical to FwL vertical
Inter-canthal width	Distance between CR vertical to CL vertical
Nasal width	Distance between AR vertical to AL vertical
Stomium width	Distance between LcR vertical to LcL vertical

Note: Tr=Trichion, CR=Lateral canthus right, CL=Lateral canthus left, AR=Ala right, AL=Ala left, LcR=Lip commissure right, LcL=Lip commissure left, FwR=Facial width right, FwL=Facial width left, Me=Menton

Table 5: Description of presumed facial golden proportions

Facial Planes	Definition
	Vertical golden roportions
FH: NH	Forehead height: Nasal height
FH: MH	Forehead height: Mandible height
FH: UFH	Forehead height: Upper facial height
UFH: MFH	Upper facial height: Middle facial height
UFH: LFH	Upper facial height: Lower facial height
FFH: UFH	Full facial height: Upper facial height
FFH: MLFH	Full facial height: Middle + Lower facial height
NH: ULH	Nasal height: Upper lip height
MFH: NH	Middle facial height: Nasal height
MFH: MH	Middle facial height: Mandible height
FH: MLFH	Forehead height: Middle+ Lower facial height
MFH: MLFH	Middle facial height: Middle+ Lower facial height
LFH: MLFH	Lower facial height: Middle+ Lower facial height
NH: LFH	Nasal height: Lower facial height
MH: LFH	Mandible height: Lower facial height
MH: ULH	Mandible height: Upper lip height
	Horizontal golden proportions
FW: ICW	Facial width: Inter-canthal width
ICW: SW	Inter-canthal width: Stomium width
SW: NW	Stomium width: Nasal width

variance for both subgroups; Attractive versus Class I and Attractive versus Class II division 1.

The average values of all the significant proportions varied from 0.12 to 2.18 in the attractive group, in the Class I group and 0.93-2.13 in the Class II division 1 group from the ideal value of 1.618.

The average value of proportion UFH: MFH was 0.02, MFH: MLFH was 0.038 SW: NW was 0.29 in the Class I group of an attractivegroupand UFH: MFH was 0.02, MFH: MLFH was 0.028 SW: NW was 0.41 in Class II division1 group as compared to the ideal value of 0.618.
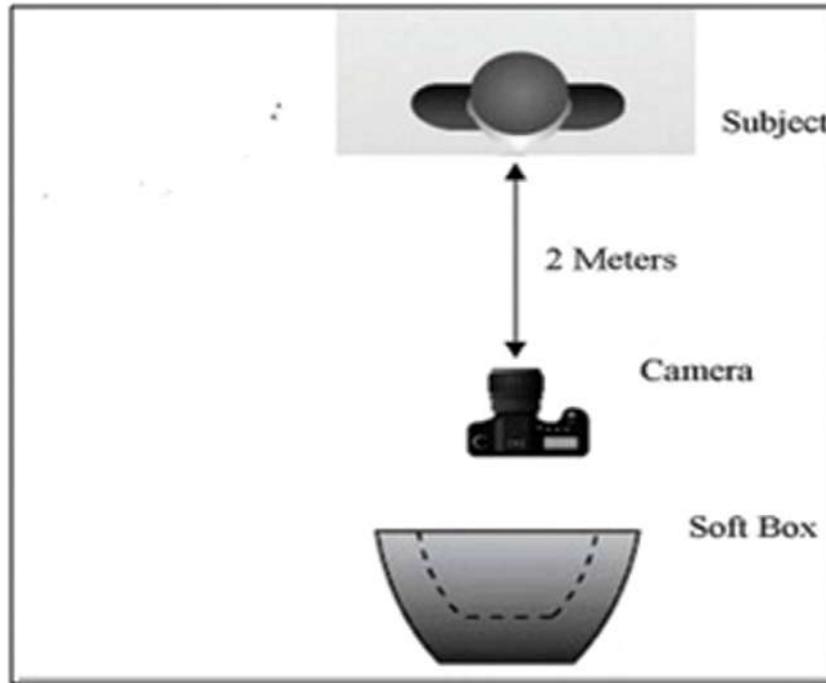
Discussion

From the era of ancient Greeks, through the

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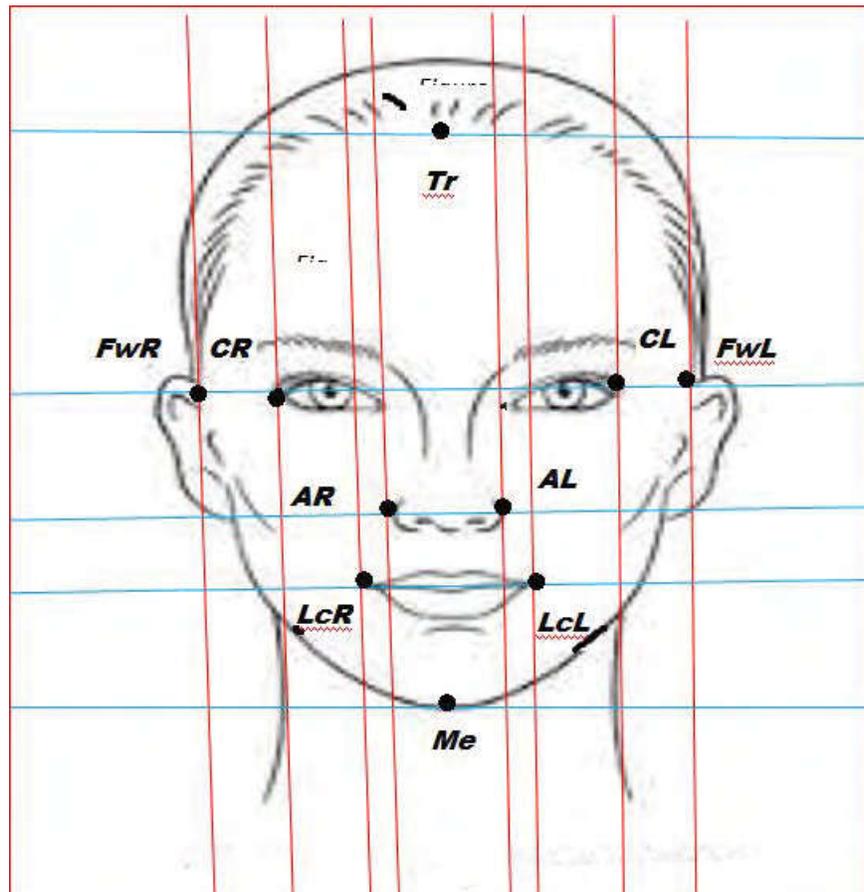
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Fig. 1: Photographic set up line diagram

Fig. 2: Landmarks: Tr – Trichion, FwR – Facial width right, FwL – Facial width left, CR – Lateral canthus right, CL – Lateral canthus left, AR – Ala right, AL – Ala left, LcR – Lip commissure right, LcL – Lip commissure left, Me – Menton

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Renaissance and the present day, mathematicians, scientists, architects, artists and cosmetic surgeons have been intrigued by the ubiquitous nature of the divine proportion and its correlation with esthetics. Ricketts showed that the proportions in a face generally perceived as being beautiful are intimately related to the golden ratio.[21]

Beauty is defined as a combination of qualities, such as shape, colour or form that pleases the senses of the mind. Facial beauty especially is an important and valued aspect of human life.[11]

The golden proportions have been used for centuries to define and formulate mathematical equations to measure beauty. Several researchers in the past studied the facial features of celebrities in the fashion industry and winners of beauty pageants; however, these individuals represented a very small percentage of the population.[11]

Facial Attractiveness is a perception of beauty related to cognitive processes and cultural preferences.[11]

The present study evaluated the facial soft tissues of class I and class II malocclusion with the mean age was (21.6) years which is the most frequently reviewed age of orthodontic clinics to study the effect of malocclusion on facial beauty.

According to Ahluwalia Rajiv etal.[11] the values ranged from in class I malocclusion 0.92 to 2.19, and in-class II div 1malocclusion 0.94 to 2.14 in class II division 2 malocclusion. The proportions that included the forehead height (FH: NH) toStomium width (SW: NW) show statistically significant differences between groups. Therefore, the height of the forehead appeared to have little effect on facial features among malocclusion groups. This result was on par with the present study.

Mantelakis et al. noted that most of the facial ratios for attractive male and female black subjects do not correspond to the golden proportion which was not on par with the present study.[22]

Rodriguez et al.[23] and Pancherz et al.[24] found that attractive patients have an increased ANB and a more convex profile than the non-attractive ones. This result was on par with the present study.

A significant difference in the vertical and transverse ratio of the Class II division 1group highlighted their variation in skeletal and soft tissue morphologies from the control groupaccording to Rajiv A et al.[11] This result was on par with the present study.

Johnston DJet al. concluded that the characteristics of an attractive face may be partially governed by golden proportions, but the present study failed to correlate attractive facial features to an ideal golden number.[25]

Kiekens et al.[26] analyzed the putative relationship between facial esthetics and golden proportions in white adolescents and found few proportions to significantly affect facial esthetics. They concluded that attractive patients did have golden proportions closer to the ideal and facial beauty was measurable to some degree, which was contrary to our findings.

Farkas et al. reported that American, Afro-American, Caucasian, Malaysian, Indian, Arabic and Chinese people have different facial characteristics, which are affected by race and ethnicity.[27]

The deviations in this study than the group indicated a longer upper lip height in 3 groups and a shorter forehead height in class II div 1 group. This does not agree with Burusapat and Lekdaeng,[28] witch determined modern facial proportions of the most beautiful women in the 21st century, also nose height was shorter in 3 groups this agrees with Mizumotoet al.[29]

Patients often are specific in their requests for facial rejuvenation procedures: Nose reduction, nose tip elevation, lip enhancement, brow lift, or chin augmentation. Creating the esthetic ideal relies less on site-specific reduction, augmentation or straightening of facial features and more on a holistic approach, considering each feature as it relates to the rest of the face. Hence, one must consider the (n) number of various measurements that can be made in an area as anatomically complicated as a human skull and further study relative to this mathematical relationship is needed before ascertaining its clinical implications as an important parameter for achieving esthetic harmony.[30]

Pothanikat et al.,[31] studied Asian female subjects and revealed that the most attractive groups had the least convex face, larger foreheads, and wider faces. Studies on Italian competitions in 2009 and 2010 were performed and compared with the normal population. Attractive women had a more acute soft-tissue profile, increased upper facial width and middle facial depth, larger mouth, and more voluminous lips.

Further research can be carried out amongst various other age groups and racial parameters.

Significance of Study

The finding of this study demonstrates the

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difference between dentists and laypersons in their perception of smile esthetics.

Dentists should be careful in ensuring that they do not impose their esthetic norms upon their patients.

Conclusions

a. Golden proportions would not be an ideal method of classifying malocclusion but may be useful in determining the pre-treatment baseline and designing an optimum treatment plan for an aesthetic result.

b. Most of the proportions of class I malocclusion was significantly different from the golden proportion, therefore it should not be considered for every patient with Angle molar class I and a straight profile that is attractive.

c. The horizontal proportions indicated a wide nose width, smallmouth width, wide eye width and small upper facial width.

d. The vertical proportions indicated nose height was shorter in class II div 1 than in other groups with statistically significant differences.

Limitations

It should be kept in mind that divine proportions are not absolute determinants of facial attractiveness. It is the individual esthetic character of facial features, not just their proportions that significantly influence the assessment of facial beauty and attractiveness.

If the divine proportions are to be used in orthodontic/orthognathic surgical planning, they should be used only as general guidelines alongside other well-established treatment planning methods

The characteristics of an attractive face may be partially governed by golden proportions.

Some important elements which possibly affect facial attractiveness are harmony, symmetry, dimorphism, balance, youthful appearance and ethnicity.

In addition, specific skin characteristics, such as texture or appearance, may be of great importance in the evaluation of natural attractiveness.

The present study failed to correlate other facial features to an ideal golden number.

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