Divine Proportions in the Assessment of Facial Esthetics—Antiquity vs Contemporary: A Systematic Review

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Abstract

Objective: The objective of this research was to systematically evaluate evidence regarding the correlation between divine proportions and facial esthetics.

Materials and Methods: An extensive literature search was performed in multiple electronic databases such as PubMed, Medline, Embase, ScienceDirect, and ProQuest which included articles published from May 1982 to March 2021 in the English language. Furthermore, only randomized clinical trials and original research studies were included. The risk of bias in the included studies was assessed by using the Cochrane risk-of-bias tool ROBVIS (Risk-of-bias VIsualization tool).

Results: A total of 2,736 articles were retrieved and 974 duplicate records were eliminated; subsequently, articles were screened based on title and abstracts, inclusion and exclusion criteria from which a total of 14 original articles were included in the systematic review. Of the 14 included studies, 5 studies showed a low risk of bias, 6 studies showed a moderate risk of bias, and 3 showed a high risk of bias. Four studies showed a positive correlation and 10 studies showed a negative correlation between divine proportions and facial esthetics.

Conclusion: The evidence from this study suggests that there exists a weak correlation between divine proportions and facial esthetics. Hence, divine proportions are not absolute determinants and are only partially related to facial attractiveness. Further high-quality cross-sectional studies with a strong methodology are needed to establish the correlation between divine proportions and facial esthetics and to support this evidence.

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Keywords

Divine proportion, golden proportion, esthetics, facial esthetics, attractiveness

Introduction

The clinical ability to alter the dentofacial form requires an understanding of facial esthetics. Orthodontists, maxillofacial, and plastic surgeons have contributed to this ongoing effort by studying the human face and establishing guidelines for the reconstruction of facial dysmorphology. Understanding these guidelines is vital for any clinician involved in treatment that will alter a patient’s dentofacial appearance via orthodontics, facial growth modification, corrective jaw surgery, or plastic surgery.¹

The significance of facial beauty is immense with psychological, sociological, moral-philosophical, and scientific conceptions often intertwined.² Facial esthetics was based on many qualities and characteristics of a human face that may be responsible for it being perceived as beautiful; therefore, the perception of what constitutes facial beauty seems to be multifactorial which includes ideal proportions,³,⁴ bilateral symmetry,⁵,⁶ averageness,⁷,⁸ sexual dimorphism,⁹,¹⁰

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of all these characteristics, facial proportions are a key area of interest in the field of orthodontics, maxillofacial, and plastic surgery. The concept that “ideal” proportions are the secret of beauty is the oldest idea regarding the nature of beauty. Throughout the ages, painters and sculptors such as Vitruvius, Leonardo da Vinci, and Albrecht Durer have attempted to establish the guidelines, norms, and standards have been proposed to describe ideal proportions in the human face. However, possibly the most famous of all axioms about ideal proportions is divine proportion.

After examining several divine ratios within the face, Matila Ghyka, Seghers et al., and Ricketts advocated the use of these divine proportion ratios as a guideline during orthodontic treatment planning and orthognathic surgery. However, in recent studies, conflicting evidence regarding this correlation has emerged. The faces of professional models have not always been found to fit the golden proportion and studies have assessed the prevalence of the golden proportion in the general population rather than just attractive faces. Therefore, more research evidence is required to substantiate the true significance of this fascinating yet debatable concept in the clinical assessment of facial esthetics, suggesting the need to evaluate the relationship between divine proportion and facial esthetics.

**Objectives**

The objective of this systematic review was to determine whether there exists a correlation between divine proportions and facial esthetics.

**Materials and Methods**

**Protocol and Registration**

This systematic review was conducted as per the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). This study was registered in the International prospective register of systematic reviews (PROSPERO) at the National Institute of Health Research database (PROSPERO, https://www.crd.york.ac.uk/prospero/registration; ID- CRD42022302308).

**Focused Participants, Investigation, Comparison, and Outcomes Question (PICOS)**

The research question was formulated by using the PICO format as described in Table 1 as follows: “Do divine proportions influence the overall facial esthetic assessment in subjects with attractive facial profile over subjects with unattractive facial profile?”

**Eligibility Criteria for Article Selection**

1. Type of studies: Original research, randomized controlled trials.
2. Publication period: Articles published from May 1982 to March 2021.
3. Language restriction: Studies that are in the English language only.
4. Studies with research work involving equal or more than 20 subjects.

**Exclusion Criteria**

1. Letters, editorials, abstracts, and unavailable full-text articles.
2. Other than English language publications.
3. Articles considering only dental esthetics but not facial esthetics.
4. Studies with research work involving less than 20 subjects.
Information Sources and Literature Search

An extensive literature search was performed by 2 review authors (AS and GR) in multiple electronic databases such as PubMed, Medline, Embase, ScienceDirect, and ProQuest, which included all articles published from May 1982 to March 2021. An e-mail alert was set for the PubMed search which allowed updates for results during the process of review and alerts were checked regularly until May 2021. Moreover, hand searches were done from the references of relevant articles for additional studies. The list of search engines used and the results obtained using Medical Subject Headings (MeSH) terms and keywords are presented in Table 2.

Search Strategy

The literature search, study inclusion, methodology, quality assessment, and data extraction were performed independently by 2 reviewers (AS and GR) and the results of the search were revised by the third and fourth authors (AK and MR). The search strategy employed a combination of MeSH terms and keywords or free-text words and the corresponding Boolean operators for PubMed and was optimized for each database respectively. An advanced search was performed in each database with a similar combination of MeSH terms and keywords. The details of MeSH terms and keywords and the combination of MeSH terms and keywords or free-text words used in the PubMed search strategy are shown in Table 3.

Study Selection

The eligibility of the identified studies was initially checked by screening their titles and abstracts. The full text of the relevant articles was read and judged against the inclusion/exclusion criteria for a final judgment. The process of study selection was performed by 2 independent review authors (AS and PR), and conflicts were resolved by contacting a third review author (PK).

Data Collection and Data Items

The process of data extraction was performed independently by 2 review authors (AK and PK), and disagreements were resolved via discussion with a third reviewer (GR). The following data items from each of the included articles were extracted: general information (the name of the authors, the year of publication, and study setting), methodology (study design and outcome comparison), participants (sample size, age, and gender), and outcome (correlation of divine proportion with esthetics, esthetic assessment, and attractiveness).

Risk of Bias Within the Studies

The risk of bias in the included studies was assessed by referring to the guidelines described in the Cochrane Handbook for Systematic Reviews of Interventions.22,23 Risk-of-bias assessment was performed independently by 2 review authors (PR and MR). Any disagreement was resolved

| Table 2. List of Search Engines and the Result Obtained Using MeSH Terms and Keywords or Free-Text Words. |
|---------------------------------|---------|---------|
| Database                  | Result | Final |
| PubMed                   | 343     | 6       |
| MEDLINE                  | 239     | 1       |
| Embase                   | 692     | 2       |
| ScienceDirect           | 543     | 3       |
| ProQuest                | 919     | 2       |
| **Total**               | **2,736** | **14** |
Results

Study Selection

A total of 2,736 articles were retrieved from the databases through the search process. After the removal of duplicates, 794 articles remained which were screened based on their titles and abstracts. A final sample of 53 articles was read in the full text of which 14 original articles subsequently met the inclusion criteria. The selection and identification processes of the study were presented as a PRISMA flow diagram as shown in Figure 1.

Study Characteristics

The characteristics of the included studies were summarized as shown in Table 4. Fourteen original articles were included in this review, of which 4 studies assessed divine proportions using the photographs of professional models, 3 studies evaluated divine proportions between the pretreatment and posttreatment subjects, 5 studies evaluated divine proportions between the photographs of attractive and unattractive individuals, 1 study appraised the divine proportions between professional models and the general population, and 1 study assessed the divine proportions between original and manipulated photographs.
Table 4. Characteristics of Included Studies.

| Author               | Sample | Parameters and Landmarks Used | Conclusion                                      |
|----------------------|--------|-------------------------------|------------------------------------------------|
| 1. Ricketts          | n = 10 | Horizontal: (4)               | Esthetics be measured scientific rather than the subjective perceptions as used in the past. |
|                      | 7 whites, 2 Asians and 1 Black taken from magazine advertisements | 1. Mouth bridge width : Nose width, 2. Mouth width : Nose width, 3. Eye width at lateral canthus : Nose width, 4. Head width at temporal soft tissue : Nose width. | |
|                      |        | Vertical: (6)                 |                                                 |
|                      |        | 1. Eye to menton : Forehead to the eye, 2. Forehead to the nose : Menton to ala of the nose, 3. Nose to the chin : Eye to the ala of the nose, 4. Stomion to the eye : Stomion to menton, 5. Eye to nose : Ala to stomion, 6. Stomion to chin : Ala to stomion. | |
| 2. Moss et al        | n = 24 | Horizontal: (3)               | The facial proportions of professional models did not fit to divine proportions. |
|                      |        | 1. Nose width : Mouth width, 2. Right eye : Mouth width, 3. Left eye : Mouth width. | |
| 3. Bakers and Woods  | n = 46 | Vertical: (10)                | No correlations found between changes in esthetic ratings and changes in the divine proportions. |
|                      |        | 1. Exocanthion to menton : Trichion to exocanthion, 2. Trichion to ala lateralis : Ala lateralis to menton, 3. Menton to ala lateralis : Ala lateralis to exocanthion, 4. Exocanthion to cheilion : Cheilion to menton, 5. Exocanthion to ala lateralis : Ala lateralis to cheilion, 6. Menton to cheilion : Cheilion to ala lateralis, 7. Exocanthion to menton : Ala lateralis to menton, 8. Trichion to exocanthion : Exocanthion to ala lateralis, 9. Exocanthion to cheilion : Exocanthion to ala lateralis, 10. Ala lateralis to menton : Cheilion to menton. | |
| 4. Shell and Woods   | n = 32 | Horizontal: (3)               | Divine proportions seemed to have little influence on overall aesthetic outcomes. |
|                      |        | 1. Width of the mouth : Width of the nose, 2. Distance between the lateral canthi : Width of the mouth, 3. Width of the face : Distance between the lateral canthi | |
|                      |        | Vertical: (10)                | |
|                      |        | 1. Lateral canthus of eye to menton : Trichion to lateral canthus of eye, 2. Trichion to ala of nose : Ala of nose to menton, 3. Ala of nose to menton : Lateral canthus of eye to ala of nose, 4. Angle of mouth to lateral canthus of eye : Angle of mouth to menton, 5. Ala of nose to lateral canthus of eye : Ala of nose to angle of mouth, 6. Angle of mouth to menton : Ala of nose to angle of mouth, 7. Lateral canthus of eye to menton : Ala of nose to menton, 8. Trichion to lateral canthus of eye : Lateral canthus of eye to ala of nose, 9. Lateral canthus of eye to angle of mouth : Lateral canthus of eye to ala of nose, 10. Ala of nose to menton : Angle of mouth to menton. | |
| 5. Medici Filho et al| n = 20 | Horizontal: (2)               | There exists a relationship between divine proportion and facial esthetics, ratios provide more favorable facial esthetics when in divine proportion. |
|                      |        | 1. Mouth width : Nose width, 2. Eye width : Mouth width. | |
|                      |        | Vertical: (2)                 | |
|                      |        | 1. Lower facial line to lip commissure : Lateral canthus to lip commissure, 2. Nose base to lateral canthus : Nose base to lip commissure. | |

(Table 4 continued)
| Author | Sample | Parameters and Landmarks Used | Conclusion |
|--------|--------|------------------------------|------------|
| 6. Kiekens et al\(^{28}\) | 64 photographs assessed based on mean Visual Analog Scale (VAS) scores | Horizontal: (9)  
1. Endocanthion right to Endocanthion left : Face width at bipupil line,  
2. Endocanthion right to Endocanthion left : Exocanthion right to exocanthion left,  
3. Exocanthion right to Endocanthion right : Endocanthion right to endocanthion left,  
4. Endocanthion left to exocanthion left : Endocanthion right to endocanthion left,  
5. Endocanthion right to endocanthion left : Alare right side to alare left side  
6. Middle of the pupil to right side to middle of the pupil the left side : Exocanthion right to exocanthion left,  
7. Alare right side to alare left side : Cheilion right to cheilion left,  
8. Cheilion right to cheilion left : Exocanthion right to endocanthion right,  
9. Cheilion right to cheilion left : Face width at bipupil line.  
Vertical: (10)  
1. Trichion to Nasion at bipupil line : Nasion at bipupil line to stomion,  
2. Trichion to Nasion at bipupil line : Subnasale to menton,  
3. Nasion at bipupil line to Stomion : Subnasale to menton,  
4. Trichion to subnasale : Nasion at bipupil line to menton,  
5. Nasion at bipupil line to subnasale : Subnasale to menton,  
6. Subnasale to stomion : Subnasale tomenton,  
7. Stomion to menton : Subnasale to menton,  
8. Subnasale to stomion : Stomion to menton,  
9. Labrale superior to Stomion : Subnasale to stomion,  
10. Labrale superior to stomion : Stomion to labrale inferior. | Few golden proportions have a significant relationship with facial esthetics in adolescents |
| 7.\(^{29}\) Mizumoto et al\(^{29}\) | 74 photographs of Group 1: 30 young adults Group 2: 30 models Group 3: 14 popular actresses  
• Males: 0  
• Females: 74 | Horizontal: (3)  
1. Mouth width : Nose width,  
2. Mouth width : Eye width,  
3. Head width : Eye width  
Vertical: (7)  
1. Trichion to menton : Lateral canthus of eyes to menton,  
2. Trichion to lateral canthus of eyes : Lateral canthus of eyes to menton,  
3. Lateral rim of nose to menton : Trichion to lateral rim of nose,  
4. Lateral canthus of eyes to lateral rim of nose : Lateral rim of nose to menton,  
5. Cheilion to menton : Lateral canthus of eyes to cheilion,  
6. Lateral rim of nose to cheilion: Cheilion to menton,  
7. Lateral rim of nose to cheilion : Lateral canthus of eyes to lateral rim of nose | Divine proportion might be useful application for facial esthetics |
| 8. Pancherz et al\(^{30}\) | 68 photographs divined attractive and nonattractive groups  
Attractive: 34  
• Males: 5  
• Females: 29  
Nonattractive: 34  
• Males: 21  
• Females: 13 | Horizontal: (4)  
1. Nose bridge width : Nose width,  
2. Mouth width : Nose width,  
3. Eye width : Nose width,  
4. Head width : Nose width  
Vertical: (6)  
1. Nose height : Nose to lip distance,  
2. Chin height : Nose to lip distance,  
3. Forehead height : Nose to lip distance,  
4. Lower face height : Nose to lip distance,  
5. Upper face height : Nose to lip distance,  
6. Total face height : Nose to lip distance | Divine proportions are not absolute determinants and partially related of facial attractiveness |

(Table 4 continued)
| Author                  | Sample          | Parameters and Landmarks Used                                                                 | Conclusion                                                                 |
|------------------------|-----------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Rossetti et al31        | n = 60          | Vertical: (7)                                                                                 | Most of the facial ratios were different from the golden ratio.           |
|                        | 3D stereo photogrammetric facial acquisitions of the subjects | 1. Trichion to menton : Physiognomical height of the face/Trichion to subnasale : Height of the upper face,  
|                        | Males: 30       | 2. Trichion to menton : Physiognomical height of the face/Nasion to menton : Morphological height of the face,  
|                        | • 15 attractive  | 3. Trichion to subnasale : Height of the upper face/Subnasale to menton : Height of the lower face,  
|                        | • 15 nonattractive | 4. Subnasale to menton : Height of the lower face/Stomion to menton : Height of the mandible,  
|                        | Females: 30     | 5. Nasion to subnasale : Nose height/Stomion to menton : Height of the mandible,  
|                        | • 15 attractive  | 6. Oculare to menton : Eye to chin distance/Trichion to oculare : Forehead to eye distance,  
|                        | • 15 nonattractive | 7. Oculare to stomion : Eye to mouth distance/Stomion to menton : Height of the mandible.               |
| Carrera Garrido et al32 | n = 20          | Vertical: (7)                                                                                 | Most of golden proportions have a significant relationship with facial esthetics after treatment |
|                        | Pre- and posttreatment photographs of subjects with surgical treatment of skeletal class III subjects | 1. Chin to wing of the nose : Wing of the nose to bipupilar plane,  
|                        |                 | 2. Bipupilar plane to labial commissure : Labial commissure to chin,  
|                        |                 | 3. Bipupilar plane to chin : Trichion to bipupilar plane,  
|                        |                 | 4. Trichion to wing of the nose : Wing of the nose to chin,  
|                        |                 | 5. Chin to labial commissures : Labial commissures to wing of the nose,  
|                        |                 | 6. Maximum head height : Maximum head width,  
|                        |                 | 7. Bipupilar plane to chin : Wing of the nose to chin.                                           |
| Malkoc and Fidancioglu33 | n = 60          | Horizontal: (3)                                                                               | No significant relationship was found between any of the divine proportions and facial esthetics |
|                        | Photographs assessed based on mean Visual Analog Scale (VAS) scores | 1. Mouth width : Nose width,  
|                        | • Males: 30     | 2. Mouth width : Eye width,  
|                        | • Females: 30   | 3. Head width : Eye width  
|                        |                 | Vertical: (16)                                                                                |                                                                           |
|                        |                 | 1. Trichion to exocanthion : Exocanthion to alare,  
|                        |                 | 2. Trichion to exocanthion : Cheilion to menton,  
|                        |                 | 3. Trichion to alare : Trichion to exocanthion,  
|                        |                 | 4. Trichion to alare : Exocanthion to cheilion,  
|                        |                 | 5. Trichion to alare : Alare to menton,  
|                        |                 | 6. Trichion to menton : Trichion to alare,  
|                        |                 | 7. Trichion to menton : Exocanthion to menton,  
|                        |                 | 8. Exocanthion to alare : Alare to cheilion,  
|                        |                 | 9. Exocanthion to cheilion : Exocanthion to alare,  
|                        |                 | 10. Exocanthion to cheilion : Cheilion to menton,  
|                        |                 | 11. Exocanthion to menton : Exocanthion to trichion,  
|                        |                 | 12. Exocanthion to menton : Exocanthion to cheilion,  
|                        |                 | 13. Exocanthion to menton : Alare to menton,  
|                        |                 | 14. Alare to menton : Exocanthion to alare,  
|                        |                 | 15. Alare to menton : Cheilion to menton,  
|                        |                 | 16. Cheilion to menton : Alare to cheilion.                                                      |
| Akan et al34            | n = 60          | Horizontal: (3)                                                                               | Divine proportion have little effect on attractiveness                     |
|                        | Photographs divined attractive and nonattractive groups | 1. Mouth width : Nose width  
|                        | Attractive: 30  | 2. Face width : Mouth width,  
|                        | Non Attractive: 30 | 3. Face width : Inter-eye width  
|                        |                 | Vertical: (7)                                                                                |                                                                           |
|                        |                 | 1. Trichion to menton : Trichion to subnasale  
|                        |                 | 2. Trichion to menton : Nasion to menton  
|                        |                 | 3. Trichion to subnasale : Subnasale to menton  
|                        |                 | 4. Subnasale to menton : Stomion to menton  
|                        |                 | 5. Nasion to subnasale : Stomion to menton  
|                        |                 | 6. Nasion to menton : Nasion to trichion  
|                        |                 | 7. Medial canthus to menton : Stomion to menton.                                               |                                                                           |
| Author                  | Sample                      | Parameters and Landmarks Used                                                                 | Conclusion                                                                 |
|------------------------|-----------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Mantelakis et al35     | n = 40                      | Vertical: (6) 1. Forehead height : Intereye to interalae, 2. Forehead height : Stomion to soft menton, 3. Ala to soft menton : Stomion to soft menton, 4. Intereye to interalae : Interalae to stomion, 5. Intereye to soft menton : Interalae to soft menton, 6. Intereye to soft menton : Intereye to stomion Horizontal: (6) 1. Intertemporal : Intercanthal, 2. Intercanthal : Intercheilion, 3. Interala : Interdacryon 4. Interalae : Nose width, 5. Intercheilion : Interalae, 6. Intercheilion : Interalae | No correlation was found between facial ratios in professional models with the golden proportion. |
| Burusapat and Lekdaeng36 | n = 32                      | Horizontal: (5) 1. Intercanthal : Intertemporal, 2. Intercanthal : Intercheilion, 3. Interala : Interdacryon 4. Interalae : Nose width, 5. Intercheilion : Interalae, 6. Intercheilion : Interalae Vertical: (9) 1. Trichion to endocanthion : Endocanthion to gnathion, 2. Gnathion to Ala : Ala to trichion, 3. Endocanthion to Ala : Ala to gnathion, 4. Gnathion to chelion : Chelion to endocanthion, 5. Chelion to Ala : Ala to endocanthion, 6. Ala to chelion : Chelion to gnathion, 7. Endocanthion to chelion : Endocanthion to gnathion, 8. Endocanthion to Ala : Endocanthion to chelion, 9. Ala to gnathion : Endocanthion to gnathion. | Facial divine ratios were significantly invalid for considering modern facial proportions of beauty |

Note: Significance of * and *** indicate study shows positive correlation between divine proportions and facial esthetics.

Figure 2. “Traffic Light” Plot of Risk of Bias of Individual Studies.

Source: Risk-of-bias VISualization tool (ROBVIS).
Risk of Bias

The results of the risk of bias assessment in the included studies, which we performed according to the Cochrane Handbook for Systematic Reviews of Interventions using the ROBVIS tool depicted as Traffic Light plot as shown in Figure 2 and Summary plot as shown in Figure 3. Based on these criteria, 5 studies showed a low risk, 6 showed a moderate risk of bias, and 3 showed a high risk of bias.

Discussion

This review provided an insight into the relationship between divine proportions and facial esthetics. It is worth mentioning that no previous systematic review has addressed the correlation between divine proportion and facial esthetics. Ricketts\(^{19,20}\) was the first to stipulate instead of resorting to subjective perception. Facial beauty can be mathematically analyzed using divine proportions and strongly suggested that esthetics can indeed be made scientific rather than resorting to subjective perceptions. Ricketts measured facial proportions using a golden divider which depicts phi relationships between the two inside dimensions, when expanded on facial photographs an increase will always occur in the exact same proportion and maintain the phi relationship between the measured landmarks. However, the facial golden ratio was analyzed by Ricketts using a small sample of only 10 frontal view photographs of professional models taken from magazine advertisements and furthermore, no statistical comparison was made with a similar unattractive group or general population which questions the validity of the study.

Using 3-dimensional facial scans, Moss et al\(^{24}\) and Rossetti et al\(^{31}\) investigated the role of the golden proportions in evaluating facial esthetics. Moss et al\(^{24}\) used optical-surface laser scanning, whereas Rossetti et al\(^{31}\) used 3-dimensional stereophotogrammetry imaging system (Vectra-3D; Canfield Scientific Inc) for 3-dimensional image acquisition and measurement of facial ratios. Both studies concluded that the ratios between the 3-dimensional facial distances were not related to attractiveness because most of the facial ratios were different from the golden ratio.

Baker et al\(^{25}\) and Shell et al\(^{26}\) investigated the role of divine proportions in the esthetic improvement of patients undergoing combined orthodontic and orthognathic-surgical treatment. The facial measurements were hand-traced on photographs and facial ratios were calculated after evaluation. Most subjects were considered esthetic after treatment but no correlation was evident between the change in facial esthetic rating and the facial proportion ratios approximating toward divine ratio. In contrast, Garrido et al\(^{32}\) esthetically assessed class III patients requiring orthodontic-orthognathic surgical treatment according to the divine proportion. Subjects appeared esthetic after the treatment and most facial ratios presented a statistically significant difference approximating the golden ratio.

Medici Filho et al\(^{27}\) investigated the relationship between divine proportions and facial esthetics in frontal photographs before and after the manipulation of facial proportions toward divine ratio. The photographs were digitized and transferred to PowerPoint software (Microsoft Corporation) for calibration and measurement. It was observed that manipulated photographs showed better esthetic rating than original photographs which implied the existence of a relationship between divine proportion and facial aesthetics.

Kiekens et al\(^{28}\) and Malkoc and Fidancioglu\(^{33}\) analyzed the relationship between facial esthetics and putative golden proportions in attractive adolescents. In both studies measurements were made on frontal photographs using Sigma Scan Software (Systat Software GmbH). After the evaluation, however, only a few golden proportions exhibited a significant relationship with facial esthetics in adolescents. On the contrary, Mizumoto et al\(^{29}\) assessed facial golden proportions among young Japanese women between popular actresses and the general population using image processing software (NIH Image, version 1.62, National Institutes of Health). On calculating, popular actresses had golden proportions in all measurements whereas other group consisting of the general population had facial proportions that deviated from the golden proportion (ratio). The authors concluded that divine proportions might be useful in determining facial esthetics.
Pancherz et al\textsuperscript{30} compared attractive and nonattractive faces of females and males with respect to the presence of divine proportion. All the measurements were hand-traced directly on facial photographs and the proportions were calculated manually and concluded that divine proportions are not absolute determinants and partially related to facial attractiveness. Akan et al\textsuperscript{34} evaluated facial proportions to determine the correlation between facial attractiveness and divine proportions between attractive and nonattractive subjects. The measurements were made using Image J software (version 1.44; National Institutes of Health) and the findings revealed that divine proportion had little effect on attractiveness.

Mantelakis et al\textsuperscript{35} assessed the facial ratios of professional Black models using a Facial Ratio Calculator (The Accounting Resources Centre) and correlated the ratios with the golden proportion and facial esthetics. Of all the investigations, only 3 studies by Medici Filho et al\textsuperscript{27} Mizumoto et al\textsuperscript{29} and Garrido et al\textsuperscript{32} are in accordance with Ricketts hypothesis. Other studies done by Moss et al\textsuperscript{24} Baker et al\textsuperscript{25} Shell et al\textsuperscript{26} Kiekens et al\textsuperscript{28} Pancherz et al\textsuperscript{30} Rossetti et al\textsuperscript{31} Siddik Malkoc and Fidancioglu\textsuperscript{33} Akan et al\textsuperscript{34} Mantelakis et al\textsuperscript{35} Burusapat and Lekdaeng\textsuperscript{36} are in contrast with Ricketts hypothesis.

Peck and Peck\textsuperscript{37} Hönn and Güz\textsuperscript{38} and Martin\textsuperscript{39} suggested that the human perception of what constitutes facial beauty seems to be multifactorial with genetic, environmental, and cultural foundations. The researchers confirmed the presence of a cross-cultural agreement regarding facial attractiveness. Because we live in a multiethnic society, it is important to have norms for various groups which illustrate the need for individualistic treatment of each facial ratio and an improved understanding of the potential link between facial attractiveness and proportions.\textsuperscript{40-42}

**Conclusion**

Based on existing evidence, the following conclusions can be drawn regarding the correlation between divine proportions and facial esthetics.

1. Divine proportions are not absolute determinants and are only partially related to facial attractiveness.
2. Divine proportions appear to have little influence on overall aesthetic outcomes and most facial divine ratios are significantly invalid for considering modern proportions of facial beauty.
3. Overall based on these findings, we suggest that there exists a weak correlation between divine proportions and facial esthetics.
4. Therefore, if divine proportion is employed in diagnosis and treatment planning, it should be employed only as a guideline together with other methods already established in the literature.

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**Statement of Informed Consent and Ethical Approval**

Necessary ethical clearances and informed consent was received and obtained respectively before initiating the study from all participants.

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