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GOLDEN PROFILOGRAPHY: AESTHETICS OF FACIAL PROPORTIONS IN A GROUP OF STUDENTS FROM THE FACULTY OF DENTISTRY OF THE UNIVERSITY OF CUENCA

PERFIL DE OURO: ESTÉTICA DE PROPORÇÕES FACIAIS EM UM GRUPO DE ESTUDANTES DA FACULDADE DE ODONTOLOGIA DA UNIVERSIDADE DE CUENCA

PERFILOGRAFÍA ÁUREA: ESTÉTICA DE LAS PROPORCIONES FACIALES EN UN GRUPO DE ESTUDIANTES DE LA FACULTAD DE ODONTOLOGÍA DE LA UNIVERSIDAD DE CUENCA

Sugey Anaela Aguirre Valle[1], Yanderín Nicol Apolo Carrión[1], Flavia Camila Auquilla Bravo[2], Joselyne Nayelly Jara Sangurima[1], Nancy Pilar Sauca Chalá[1], Manuel Estuardo Bravo Calderón[3]

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ABSTRACT
Introduction and objective. The approach to the harmony of a facial profile involves multiple studies, of which in this study the golden ratio and profiling are analyzed to see the aesthetics and facial pattern of the patients. Golden Profilography is defined as the drawing of the vertical facial profile of aesthetic proportions obtained by means of the golden section from a photograph of the facial profile. Material and methods. We carried out an experimental study on students in the seventh cycle of the Faculty of Dentistry of the University of Cuenca, who underwent a radiographic examination to determine their facial profile type. All of them were profiled in the same way using a photograph of the patient's facial profile with a view to the horizon and focusing on the Frankfurt horizontal plane and the Nemocast software specialized in the evaluation of facial profiles, from which we were able to obtain a precise identification and tracing of the key cephalometric points for the subsequent evaluation and determination of the facial harmony of each student. Results. With respect to the table of Percentage Values of the Student Group, a total of 15 male people were obtained with a positive sign and a percentage of 55.56%, while with a negative sign, 12 female people were obtained with a percentage of 44.44%. Regarding the facial pattern, 37.04% are dolichofacial, 44.44% mesofacial and 18.5% brachyfacial. The profilograph (mode) obtained by measuring compared to the photographic images of the patients was a mesofacial pattern with 44.44%. Conclusions. The facial profile obtained by the selected software verifies the golden aesthetics and it is evident that in a group of students a higher index of a mesofacial profile is reflected, which is historically known as a normal profile.
KEYWORDS: Nasal aesthetics. Aesthetic facial proportions. Rhinoplasty. Golden profilography.

RESUMO
Introdução e objetivo. A abordagem da harmonia de um perfil facial envolve vários estudos, dos quais, neste estudo, a proporção áurea e o perfil são analisados para ver a estética e o padrão facial dos pacientes. A Profilografia Dourada é definida como o desenho do perfil facial vertical de proporções estéticas obtido por meio da seção dourada a partir de uma fotografia do perfil facial. Material e métodos. Realizamos um estudo experimental com alunos do Sétimo Ciclo da Faculdade de Medicina Dentária da Universidade de Cuenca, que foram submetidos a um exame radiográfico para determinar o seu tipo de perfil facial. Todos eles foram perfilados da mesma forma, utilizando uma fotografia do perfil facial do paciente com vista para o horizonte e focando o plano horizontal de Frankfurt e o *software* Nemocast, especializado na avaliação de perfis faciais, a partir do qual foi possível obter uma identificação e traçado precisos dos pontos cefalométricos, chave para a posterior avaliação e determinação da harmonia facial de cada aluno. Resultados. No que diz respeito à tabela de Valores Percentuais do Grupo de Alunos, obteve-se um total de 15 pessoas do sexo masculino com sinal

[1] Golden Profilography: Aesthetics of Facial Proportions in a Group of Students from the Faculty of Dentistry of the University of Cuenca. Afiliada a la Universidad de Cuenca, Cuenca- Ecuador. Título de segundo nivel.
[2] Perfilografia Áurea: Estética das Proporções Faciais em um Grupo de Estudantes da Faculdade de Odontologia da Universidade de Cuenca. Filiado à Universidade de Cuenca, Cuenca-Equador. Título de segundo nível.
[3] Golden Profilography: Estética de Proporções Faciais em um Grupo de Estudantes da Faculdade de Odontologia da Universidade de Cuenca. Afiliado à Universidade de Cuenca, Cuenca - Equador. Terceiro e Quarto Nível, DDS, MSD, MMSc, PhD.



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positivo e um percentual de 55,56%, enquanto com sinal negativo foram obtidas 12 pessoas do sexo feminino com um percentual de 44,44. %. Quanto ao padrão facial, 37,04% são dolicofaciais, 44,44% mesofaciais e 18,5% braquifaciais. O perfilógrafo (modo) obtido pela medição comparado com as imagens fotográficas dos pacientes, foi um padrão mesofacial com 44,44%. Conclusões. O perfil facial obtido pelo *software* selecionado verifica a estética dourada e é evidente que em um grupo de estudantes reflete-se um maior índice de um perfil mesofacial, historicamente conhecido como perfil normal.
PALAVRAS-CHAVE: Estética nasal. Proporções faciais estéticas. Rinoplastia. Perfilografia dourada.

RESUMEN
Introducción y objetivo. El abordaje de la armonía de un perfil facial implica múltiples estudios, de los cuales en este estudio se analiza la proporción áurea y el perfilado para ver la estética y patrón facial de los pacientes. La Perfilografía Áurea se define como el dibujo del perfil facial vertical de proporciones estéticas obtenido mediante la sección áurea a partir de una fotografía del perfil facial. Material y métodos.Realizamos un estudio de tipo experimental en estudiantes del Séptimo Ciclo de la Facultad de Odontología de la Universidad de Cuenca, a quienes se les realizó un examen radiográfico con el fin de determinar su tipo de perfil facial. Todos ellos fueron perfilados de la misma forma utilizando una fotografía del perfil facial del paciente con vista al horizonte y con enfoque en el plano horizontal de Frankfurt y el software Nemocast especializado en la evaluación de perfiles faciales, a partir de los cuales pudimos obtener una identificación y el trazado preciso de los puntos cefalométricos clave para la posterior evaluación y determinación de la armonía facial de cada estudiante. Resultados. Con respecto a la tabla de Valores Porcentuales del Grupo Estudiantil se obtuvo un total de 15 personas del sexo masculino con signo positivo y un porcentaje del 55.56%, mientras que con signo negativo se obtuvieron 12 personas del sexo femenino con un porcentaje del 44.44%. En cuanto al patrón facial, un 37,04% son dolicofaciales, 44,44% mesofaciales y 18,5% braquifaciales. La (moda) del perfilógrafo obtenido al medir comparado con las imágenes fotográficas de los pacientes fue un patrón mesofacial con un 44.44%. Conclusiones. El perfil facial obtenido por el software seleccionado verifica la estética dorada y se evidencia que en un grupo de estudiantes se refleja un mayor índice de perfil mesofacial, lo que históricamente se conoce como perfil normal.

PALABRAS CLAVE: Estética nasal. Proporciones estéticas faciales. Rinoplastia. Perfilografía áurea.

INTRODUCTION

The constant search for precise and objective methods to assess facial harmony is fundamental in several disciplines, especially in the planning of interventions such as rhinoplasty. In this context, Golden Profilography emerges as an innovative approach to the assessment of facial proportions, taking advantage of the golden ratio, a mathematical relationship that has fascinated artists and scientists throughout history. (1)

Euclid defined the golden section by saying that "the ratio based on the golden section is the division of length into half and extreme ratio." (Fig 1). It is also known as divine proportion according to Luca Pacioli or as golden or golden section according to Leonardo Da Vinci and is based on the golden or golden ratio 1,618, an irregular number identified with the Greek letter Phi according to the term given by Mark Barr and Schooling in honor of Phidias, a scholar of classical Greece. The general algebraic rule of the golden section (SA) can be developed by geometry and elementary arithmetic from a given length equivalent to 1.618 of which, when divided by the number Phi, a major and a minor proportion are obtained (1.618 / 1.618= 1.000 + 0.618). This rule is applied to the golden rectangle (RA) (Fig 2) which measures a length equivalent to 1.618 by 1.000 at the base, and from which, when divided

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horizontally by the number Phi, a square and a rectangular segment is obtained in a proportion of 1.000 to 0.618; it is also divided vertically into a distal and a proximal segment in a proportion of 0.618 to 0.381. Therefore, the continuous golden section develops on each side and between its sides: 1.618/1.618 = 1.000 / 1.618 = 0.618 / 1.618 = 0.381. Similarly, the golden triangle with a vertex of 36° and a base of 72° has the SA by dividing one of its sides by 1.618 to obtain the base. (2,3)

In this study, objective evaluation focuses on the vertical facial profile, utilizing profile photographs commonly analyzed subjectively or through objective methods such as photogrammetry and cephalometry (radiological). Additionally, lines, planes, angles, and inclinations are employed, relating various anatomical references translated into anthropometric indices and degrees of their angles. (4,6) To achieve this, specific objectives are proposed, which includes determining the facial profile through aesthetic measurements obtained with the Nemocast program, analyzing harmonic facial profiles and classifying them according to the Ricketts facial biotype. These objectives aim to provide an in-depth understanding of the usefulness and applicability of Golden Profiling in the specific context of aesthetic dentistry.

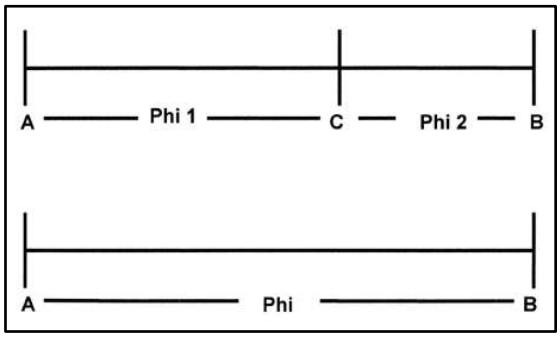


Figure 1. Golden Section and Golden Ratio

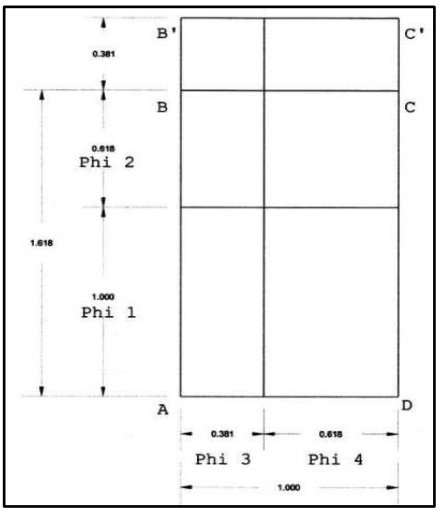


Figure 2. The horizontal and vertical golden section divides the golden rectangle (Ra) into 4 segments: Phi 1, Phi 2, Phi 3 and Phi 4, adding a Phi 3 section to its height, makes it a 2 square golden rectangle (Rc)



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Facial biotype is defined as a set of functional and morphogenetic characteristics that determine the growth pattern and craniofacial behavior of an individual (5). In the field of orthodontics, it is crucial to understand the changes that occur in the face during growth, as such growth can alter the mechanical needs during treatment (5).

Regarding the classification of biotypes based on facial skeleton proportions, we have: (4)

- Dolichofacial: Face length predominates over width.
- Brachyfacial: Facial width is predominant over height.
- Mesofacial: There is a balance between both dimensions.

MATERIAL AND METHODS

We carried out this study in students of the Seventh Cycle of the Faculty of Dentistry of the University of Cuenca from different regions of the country, who underwent a radiographic examination in order to determine their profile, purely for academic purposes. A total of 27 students were taken into account, 22 females and 5 males, with an average age of 21.96 years (maximum of 29 years and minimum of 21). A total of 7 students were excluded from the study due to lack of data required for the study.

In this study of golden profiling carried out on 34 students of the Seventh Cycle of the Faculty of Dentistry of the University of Cuenca, we used a photograph of the patient's facial profile with a view of the horizon and with a focus on the horizontal plane of Frankfurt obtained with the digital camera of mobile devices, in addition to the use of the Nemocast software as the main tool for obtaining data.

The analysis was carried out by applying this specialized software to evaluate facial profiles, providing an accurate and detailed methodology for the study of facial harmony in the selected sample. The tracing of the process was carried out automatically using this software, as it facilitates the identification and precise tracing of the desired cephalometric points. This methodology provides a quantitative basis for the evaluation of facial harmony, thus allowing a detailed and objective analysis of the golden ratios of the facial structure of the 34 students.

RESULTS

All were profiled in the same way using the software mentioned above for the study. The analysis of Rickets and Steiner was carried out automatically using the Nemocast program and we recorded the digitally obtained measurements of each of the factors involved in the determination of the "Vert", of which we give in Table I a model example of the Steiner region. This is the first time that we have been able to find a solution to this problem Based on this standard, we obtained the 5 main factors (Facial Axis, Facial Depth, Mandibular Plane, Lower Facial Height and Mandibular Arch) of each of the

patients studied, which give rise to the contour of the facial profile of aesthetic proportions. Table II shows the results obtained from the group of students.

In relation to the table of Percentage Values of the Student Group, a total of 15 male people with a positive sign and a percentage of 55.56% were obtained, while with a negative sign, 12 female people were obtained with a percentage of 44.44%.

Regarding the facial pattern, a total of 37.04% are dolichofacial, 44.44% are mesofacial and 18.5% are brachyfacial. The (mode) of the profilograph obtained when measuring compared with the photographic images of the patients was a mesofacial pattern with 44.44%.



Figs 3, 4 and 5. Images of a group of 34 patients who underwent facial profile evaluation with the help of a cephalometric image and a profile photograph.

FACTORS	STANDARD mm	DS	CB	PATIENT VALUE mm	NORM SINGLE mm	SIGN	FACIAL PATTERN
Facial Axis	90	3	Doesn't vary	88	90	-	Normofacial
Prof. Facial	87	3	+0.3/year	84	86.25	-	Normofacial
Mandibular Plane	26	4	-0.3/year	29	26.75	-	Normofacial
Lower Facial Alt.	47	4	Doesn't vary	44	47	+	Normofacial
Mandibular Arch	26	4	+0.5/year	41	44.75	+	Brachyfacial

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Table I: Verts analysis table taken as an example for the analysis of the study

Sex **M F**	**%**	**Sign** **+ -**	**%**	**Facial Pattern** **Dolichofacial(D)** **Mesofacial (M)** **Brachyfacial (B)**	**%**
M= 5 F= 22	M= 18.52% F= 81.48%	+ = 15 - = 12	+= 55.56% - = 44.44%	D= 10 M= 12 B= 5	D= 37.04% M = 44.44% B= 18.5%

Table II: Percentage Values of the Student Group

		FEMALE		**MALE**
	N	%	N	%
MESOFACIAL	9	40,91%	3	60%
DOLICHOFACIAL	9	40,91%	1	20%
BRACHYFACIAL	4	18,18%	1	20%
TOTAL	22	100,00%	5	100,00%

Table III: Frequency of facial biotypes by gender

DISCUSSION

Assessing facial features is crucial for conducting a thorough orthodontic diagnosis because the alignment of bones and teeth significantly impacts the appearance of soft tissues. (4,7) The facial biotype is influenced by factors such as age, gender, and ethnic groups. For this reason, it is crucial to establish a statistical database specific to each population regarding facial biotypes. This is important because, frequently, the available data originates from European or Asian countries, which can limit accuracy in diagnosis and treatment plans on many occasions. (8,10)

In this study, a higher prevalence of the mesofacial facial biotype was observed in both sexes; however, no statistically significant differences were found in their averages. The mesofacial and dolichofacial biotypes were more prevalent in women, while men predominantly exhibited the mesofacial biotype.

Serrano and colleagues in Ecuador found that in women, the facial biotype most commonly encountered was mesofacial at 45%, while in men, it was dolichofacial at 44%. In this research, the same biotypes reported by Serrano were identified in both women and men, with very similar prevalences. (9)

In the study conducted by (Sciaraffia, 2016), a predominant sample of mesofacial individuals (63%) was revealed, followed by a balance between brachyfacial (20%) and dolichofacial (17%) individuals. (9) In contrast to this research, according to the analysis by Steiner, the most predominant biotype was mesofacial, with 60% and 40.91% in men and women, respectively, followed by dolichofacial and, finally, brachyfacial biotype.

CONCLUSIONS

The facial profile obtained by the selected software verifies the golden aesthetics and it is evident that in a group of students a higher index of a mesofacial profile is reflected, which is historically known as a normal profile.

The method we present has its main indication for the analysis of harmonious facial profiles that agree with the literature, as shown by the study carried out on 34 patients in whom a large percentage of disproportion and aesthetic disharmony of the facial profile was diagnosed, for which it was not evident to the patients their class II or III of Angle that are related to a brachytic and dolichofacial profile.

This method is easy, fast and standardized thanks to the software used in each study of all students, this due to its ease of access and proportion for the automatic location of the required points.

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