DO LAYPEOPLE , STUDENTS AND ORTHODONTISTS HAVE SIMILAR CONCEPTS REGARDING FACIAL AESTHETICS ?

Maria Eduarda Assad **Duarte**[1], Nina **Argalji**[1], Daniela Martins de **Carvalho**[1], Oswaldo de Vasconcellos **Vilella**[1]*

[1]Departament of Orthodontics, School of Dentistry, Universidade Federal Fluminense-UFF, Niterói, RJ, Brazil.

Palavras-chave: Face. Cefalometria. Ortodontia.

RESUMO

Introdução: O ortodontista não se preocupa apenas em estabelecer a oclusão funcional, mas também em proporcionar ao paciente um perfil harmonioso, uma das principais motivações daqueles que procuram por tratamento. **Objetivo:** Analisar os perfis faciais considerados agradáveis de indivíduos leucodermas brasileiros, buscando verificar suas características em comum e, assim, orientar os ortodontistas quanto aos objetivos finais do tratamento ortodôntico em relação à estética facial. **Métodos:** Fotografias de perfil de 100 indivíduos brasileiros leucodermas adultos foram avaliadas por 15 leigos, 15 estudantes de ortodontia e 15 ortodontistas. Foram realizados traçados e análises cefalométricas dos perfis que obtiveram as melhores avaliações, incluindo medidas lineares, angulares e de proporções faciais. **Resultados:** Verificou-se uma considerável semelhança entre as simulações dos perfis faciais construídos de acordo com o resultado da avaliação de cada grupo de julgadores. Este resultado foi atribuído à influência da mídia, que de alguma forma contribuiu para homogeneizar os padrões de estética facial. **Conclusão:** Apesar da grande semelhança em relação aos conceitos estéticos apresentados pelos avaliadores, os leigos parecem preferir perfis mais côncavos quando comparados aos demais.

Keywords: Face. Cephalometry. Orthodontics.

ABSTRACT

Introduction: A harmonious profile is one of the objectives of the orthodontic planning. It is as important as to establish functional occlusion, since facial aesthetics is not only a concern for the orthodontist, but also for individuals who want to undergo orthodontic treatment. **Objective:** To analyze the facial profile considered pleasant for the white Brazilians, verify their common characteristics and, thus, guide the orthodontists in relation to facial aesthetics. **Methods:** Facial profile photographs from 100 adult white Brazilians were analyzed and evaluated by 15 lay people, 15 orthodontic students and 15 orthodontists. Tracings and cephalometric analysis were made from the best rated facial profiles, including linear and angular measurements and facial proportions. **Results:** Considerable similarities were found between the simulated profiles which were shaped according to each group's outcome. These results can be attributed to the influence of the media that, somehow, contributed to homogenize the population's standards related to facial esthetics. **Conclusion:** Despite the great similarity in relation to the aesthetic concepts showed by the evaluators, lay people seem to prefer more concave profiles when compared with the other groups.

Submitted: May 26, 2018
Modification: October 20, 2018
Accepted: October 23, 2018

***Correspondence to:**
Oswaldo de Vasconcellos Vilella
Address: Departmento de Odontoclínica, Universidade Federal Fluminense, Rua Mário Santos Braga, 30/214, Niterói-RJ, Brazil. CEP 24020-140.
Telephone number: +55 (21)2622-1621
E-mail: ovilella@id.uff.br

INTRODUCTION

Orthodontic treatment can change the position of teeth and modify the skeletal pattern of patients. The relationships between soft and hard tissues, that can influence the facial profile, have been thoroughly studied.[1-3] There are strong but complex relationships between these structures. In addition, the characteristics of facial soft tissues can also differ according to the ethnic group studied.[4,5]

According to Steiner, the separate evaluation of the soft tissue from dental and skeletal relationships can produce misleading results.[6] Therefore, aesthetic analysis of the profile is very relevant for the orthodontic diagnosis, often determining or changing the treatment plan.[7,8]

Facial aesthetics is not only a concern for the orthodontist, but also forindividuals who want to undergo orthodontic treatment. One of the major motivations forthese individuals is the desire to improve their facial appearance.[8,9]

Patient photographs are commonly used to evaluate profile esthetics,[10] although the concept of beauty is undeniably personal and subjective. In this way, it is of great importance to determine the preferences of different groups of evaluators.

The present study examined the common characteristics of pleasant facial profiles considered by laypeople, students and orthodontists. The aim was to establish a pattern of facial aesthetics that can guide orthodontists regarding the ultimate goals of the orthodontic treatment for white Brazilian patients.

MATERIALS AND METHODS

The study was approved by the Universidade Federal Fluminense Ethic Research Committee (filled under number 963.688/15) and conducted in accordance with the National Health Council Resolution 196 (10th October 1996).

One hundred profile photographs (10 x 15 cm) and lateral cephalometric radiographs were obtained from white adult Brazilian patients from the Universidade Federal Fluminense Orthodontic Clinic, including 44 males and 56 females. These individuals were between 18 and 53 years old, with an average age of 23 years and 3 months. They were randomly selected according to their identificationnumber, in crescent order, independent of the class of malocclusion presented. Low quality photographs and radiographs were excluded from the sample. The photographs and radiographs were obtained before the beginning of the orthodontic treatment.

An album with photographs, numbered 1 to 100, was gathered to evaluate the facial profiles. The sequence of the photos in the album was also done according to the patients' identification number. On each page two photos were presented.

The sample size calculation of the number of evaluators was based on the prior study of facial profile analysis published by Hockley et al.[10] The calculation was conducted usingthe same formula used in thesample calculation of cross-sectional studies, with the aid of the SPSS program. A confidence level of 95% and a critical value of 1.96 were adopted. Considering that the error of the method was estimated to 20%, the power of the research was established as 80%. As a result, 45 evaluatorswerethe minimum necessary to include in this survey. The 45 evaluators were divided as followed: 15 lay people (group 1; without dentaltraining), 15 orthodontic students (group 2) and 15 orthodontists (group 3).

All the evaluators were 18 years old or older. The careers of the laypeople group had no relation with Dentistry. Mathematics, Business and Nutrition students were invited to be inthis group. The student group should have completed at least oneyear of the post graduatecourse in Orthodontics. The orthodontist group consisted of graduate professionals, with exclusive orthodontic private practice in the cities of Niterói and Rio de Janeiro.

Each evaluator was given, along with the album, an evaluation form with a clarification of the objectives of the study and how to proceed with the conceptualization of facial aesthetics. There were five possible concepts: excellent, good, fair, poor and bad. Each evaluator was asked tomark only one option for each photo. Later these concepts were transformed into quantitative data, ranging from 5 to 1.

Tracing wasperformed on the lateral cephalometric radiographs of the five individuals who obtained the best scores in each group of evaluators. The cephalometric variables used to evaluate facial profile structures were:

1-Upper and lower lip evaluation: linear distance from the most prominent point onthe upper and lower lip to the following lines:

- S line: drawn from a point situated in the middle of the lower edge of the nose until the soft tissue Pogonion.[6]
- Aesthetic Plane: drawn from the tip of the nose until the soft tissue Pogonion.[11]
- Subnasal-Pogonion: drawn from the Subnasal point until the soft tissue Pogonion.[12]

2-Outline of the maxillary groove:

- Maxillary groove angle: formed by the union of the Subnasal point, labial sulcus and upper lip.[13]
- Maxillary groove depth: linear distance from the maxillary groove until a perpendicular line to the Frankfurt Horizontal Plane, tangent to the vermilion of the upper lip.[14]

3-Outline of the mandibular groove:

• Mandibular groove angle: formed by the union of the lower Labrale point, lower labial sulcus and soft tissue Pogonion.[13]
• Mandibular groove depth: linear distance from the mandibular sulcus to the H line, which unites the most prominent point of the upper lip with the soft tissue Pogonion.[14]

4-Powell's Aesthetic Triangle. [15]

• Nasofrontal angle: formed by the intersection of the tangent line of the Glabella with a tangent line to the nasal dorsum.
• Nasofacial angle: formed by the intersection of the Facial Plane with a tangent line to the nasal dorsum.
• Nasomental angle: formed by the intersection of Ricketts' Aesthetic Plane with a tangent line to the nasal dorsum.
• Mentocervical angle: formed by the intersection of the Facial Plane with a tangent line to the lower border of the mandible.

5-Nasolabial angle: formed by the intersection of the tangent lines of the base of the nose and of the upper lip.[16,17]

6-Vertical proportions:

• Lower Facial Height (ANS - Me): Percentage of the linear distance between the Anterior Nasal Spine and the Menton, while the Total Facial Height corresponds to the distance between the Nasion and the Menton.[18]
• Study of the middle and lower thirds of the face: Nasion is the upper limit of the middle third of the face, while the Subnasal point is its lower limit. The lower third of the face corresponds to the distance from the Subnasal until the Menton (Sn - Me). The Stomion subdivides this distance into two unequal parts (Sn - St and St - Me).[13]

Statistics

Arithmetic means and standard deviations of the cephalometric variables studied were obtained for each group.

RESULTS AND DISCUSSION

Despite its subjectivity, facial aesthetics is one of the main motivating factors for seeking orthodontic treatment. Therefore, it seems logical that a standard of what is considered a nice profile will assist the orthodontist in diagnosis and orthodontic planning.

Our results (Table 1) showed that the three evaluating groups preferred a lower facial third with upper and lower lips very close to Steiner's S line. [6]The best profiles selected ranged from slightly convex to concave. In group 1, the evaluators selected more concave profiles when compared to groups 2 and 3. The plastic surgeons, orthodontists and lay people recruited by Fortes et al also preferred slightly convex or concave profiles when they evaluated white adult Brazilians.[19]

It should be noted that, in a recent study, Chagas et al. found that white adult Brazilians have a slightly more convex facial profile than the US standard.[5] The apparent contradiction between the real and the idealized Brazilian profiles is probably a reflectionof an external influence. The Brazilian evaluators seemed to have similar aesthetic concepts than laypeople, dentists and ortho-surgical patients from the United Kingdom, who considered straight profiles as more attractive.[20]

The linear distance from the lips to the aesthetic plane and the relationship between the lips and the Subnasal-Pogonion plane were within the normal range suggested by Ricketts and Burstone, respectively.[11-13]An analogue result was evidenced regarding the angle and the depth of the maxillary groove.[14] However, the profiles selected by the lay group showed higher values for the angle and the depth of the mandibular groove when compared with the other groups, which also suggests a preference for a slightly more concave profile.

The values obtained for Powell's Aesthetic Triangle, for the ratio between the Lower Facial Height and the Total Facial Height, and for the proportions of the Lower Facial Height were quite similar to the established normal values.[8,15,16]

On the other hand, the data related to the nasolabial angle showed lower values when compared to the ones recommended by McNamara and Scheideman et al, indicating atendency for maxillary protrusion.[16, 17] In the laypersongroup, protrusion was associated with a thicker soft tissue Pogonion, which produced a more concave profile. Similar results were found in a study by Khosravanifard et al., the evaluators in the study preferred straight facial profiles and a slightly protruded maxilla, when adult Iranians were evaluated.[17]

The evaluations made by the students and graduate orthodontists showed higher scores when compared to the ones bythe lay group. Lay people generally demonstrate moredifficulty in assessing only the harmony and balance of the facial profile, without considering concepts of beauty, such as skin imperfections, acne and hair styles.[21]

Aiming to assist the visualization of the research results, cephalometric tracings were simulated with the mean profile values obtained from each of the three evaluating groups (Figure 1). A strong similarity was found between the facial profiles, showing a great consistency of opinion. This fact can probably be explained by the influence of the media. All evaluators have access to television, internet and magazines. Patterns of facial beauty have become quite homogeneous and all seem to have the same references to facial aesthetics, explaining the closeness between their preferences.[22]

Table 1: *Arithmetic means and standard deviations related from the five best rated profiles.*

Variables	Group 1		Group 2		Group 3	
	M	SD	M	SD	M	SD
S-UL (mm)	- 1.5	2.23	- 0.4	1.08	- 1.4	1.51
S-LL (mm)	- 0.9	2.01	0.4	1.85	0.4	1.78
Aesthetic Plane–UL (mm)	4.4	1.71	4.2	1.03	4.9	2.10
Aesthetic Plane–LL (mm)	2.8	1.82	2.0	1.69	1.9	2.13
Sn.Pog'–UL (mm)	3.3	2.22	4.7	1.71	3.3	1.20
Sn.Pog'–LL (mm)	2.0	2.31	3.8	2.07	3.5	2.09
Maxillary groove angle (°)	34.0	7.64	30.2	15.70	37.2	13.10
Maxillary groove depth (mm)	4.1	1.51	4.0	0.61	3.6	0.96
Mandibular groove angle (°)	52.2	15.00	45.4	12.34	48.0	7.38
Mandibular groove depth (mm)	6,4	2.10	5.4	1.91	4.8	1.35
Nasofrontal angle (°)	106.0	8.48	121.2	18.99	126.0	16.49
Nasofacial angle (°)	35.8	1.64	34.8	1.48	36.2	4.38
Nasomental angle (°)	128.0	2.82	127.2	3.76	124.0	4.35
Mentocervical angle (°)	101.2	12.67	99.8	10.96	98.2	10.96
Nasolabial angle (°)	94.8	7.12	91.6	10.01	102.4	8.87
Lower Facial Height: ANS-Me (%)	55.8	0.44	57.4	1.34	56.4	1.81
Lower third: Sn - Me (%)	53.6	1.51	54.0	1.87	52.4	1.94
Sn – St(%)	37.6	2.51	35.2	3.34	35.2	4.60
St – Me (%)	62.4	2.51	64.8	3.34	64.8	4.60

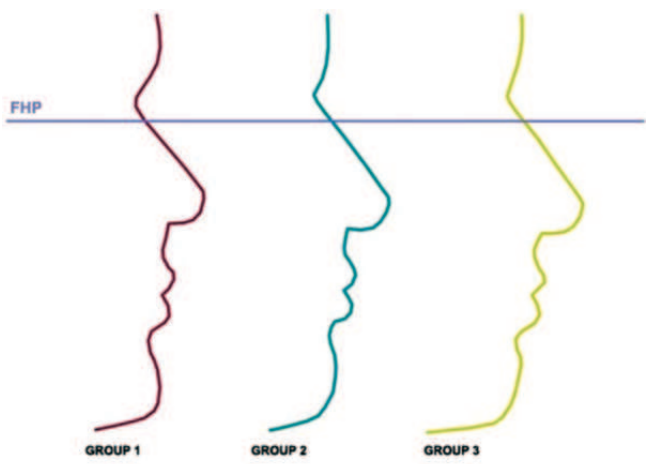

Figure 1: *Cephalometric tracings simulated in accordance to the mean values obtained from individuals selected by each group.*

CONCLUSION

Despite the great similarity in relation to the aesthetic concepts showed by the components of the three groups of evaluators, lay people seem to prefer more concave profiles when compared with the other groups.

REFERENCES

1-Huggins DG, McBride LJ. The influence of upper incisor position on soft tissue facial profile. Br J Orthod 1975; 2:141-146.

2-Ackerman JL, Proffit WR. Soft tissues limitations in orthodontics: Treatment planning guidelines. Angle Orthod 1997; 67:327-336.

3-Rodrigues MF, Vilella OV, Mucha JN. Alterações dos tecidos moles decorrentes do tratamento ortodôntico. Ortodon Gaúch 1998; 3:24-34.

4-Talbert L, Kau CH, Christou T, Vlachos C, Sou N. A 3D analysis of Caucasian and African American facial morphologies in a US population. J Orthod 2014; 41:19-29.

5-Chagas TF, Martins MM, Mucha JN. The facial profile in Brazilian adults. Braz J Oral Sci 2017;16:e17040.

6-Steiner CC. Cephalometrics for you and me. Am J Orthod Dentofacial Orthop 1953;39:729-755.

7- Foster EJ. Profile preferences among diversified groups. Angle Orthod 1973;43:34-40.

8- Bullen RN, Kook YA, Kim K, Park JH. Self perception of the facial profile: an aid in treatment planning for orthognathic surgery. J Oral Maxillofac Surg 2014;72:773-778.

9- Angle EH. Malocclusion of the teeth. 7th ed. Philadelphia: SS White Dental Manufacturing Co. 1907.

10- Hockley A, Weinstein M, Borislow AJ, Braitmand LE. Photos vs silhouettes for evaluation of African American profile

esthetics. Am J Orthod Dentofacial Orthop 2012;141:161-168.

11- Ricketts RM. Perspectives in the clinical application of cephalometrics. Angle Orthod 1981;51:115-150.

12- Burstone CJ. The integumental profile. Am J Orthod 1959;29:93-104.

13- Burstone CJ. Lip posture and its significance in treatment planning. AmJ Orthod 1967;53:262-284.

14- Holdaway, RA. A soft tissue cephalometrics analysis and its use in orthodontic treatment planning. Part I. Am J Orthod 1983;84:1-28.

15- Powell N, Humphreys B. Proportions of the esthetic face. 1st ed. New York: Thieme Stratton. 1984.

16- McNamara JA. A method of cephalometric evaluation. Am J Orthod 1984;86:449-469.

17- Scheideman GB, Bell WH, Legan HL, Finn RA and Reisch JS. Cephalometric analysis of dentofacial normals. Am J Orthod 1980;78:404-420.

18- Wylie W. The assessment of anteroposterior dysplasia. Angle Orthod 1947;17:97-109.

19- Fortes HNR, Guimarães TC, Belo IML, da Matta ENR, Photometric analysis of esthetically pleasant and unpleasant facial profile. Dental Press J Orthod 2014;19:66-75.

20- Naini FB, Donaldson ANA, McDonald F, Cobourne MT. Assessing the inuence of lower facial prole convexity on perceived attractiveness in the orthognathic patient, clinician, and layperson. Oral Surg Oral Med Oral Pathol Oral Radiol 2012;114:303-311.

21- Khosravanifard B, Rakhshan V, Raeesi E. Factors inuencing attractiveness of soft tissue prole. Oral Surg Oral Med Oral Pathol Oral Radiol 2013;115:29-37.

22- Theobald AH, Wong BK, Quick AN, Thomson WM. The impact of the popular media on cosmetic dentistry. N Z Dent J 2006;102:58-63.