Brazilian Dental Science
Ciência Odontológica Brasileira
unesp
UNIVERSIDADE ESTADUAL PAULISTA "JÚLIO DE MESQUITA FILHO"
Instituto de Ciência e Tecnologia
Campus de São José dos Campos

ORIGINAL ARTICLE

doi: 10.14295/bds.2020.v23i1.1855

Esthetic perception regarding periodontal changes: a cross-sectional study

Percepção estética quanto a alterações periodontais: um estudo transversal

Maíra Soares SASSI[1], Aislan Pereira de ALMEIDA[1], Raildo Silva COQUEIRO[1], Rui Barbosa de BRITO JÚNIOR[2], Matheus Melo PITHON[1,3]

1 - Southwest Bahia State University (UESB) - Vitória da Conquista – BA - Brazil.

2 – St. Leopold Mandic College (SLM) – Campinas – SP – Brazil.

3- Federal University of Rio de Janeiro (UFRJ) – Rio de Janeiro – RJ - Brazil.

ABSTRACT

Objective: Facial appearance has become an important factor of social interaction. The perception of patients regarding the changes promoted by treatment has become a focus of study today. Thus, the proposal of the present study was to evaluate the esthetic perception of lay people regarding esthetic periodontal changes. **Method:** The total sample comprised 180 individuals divided into three different age groups (15-19, 35-44, and 65-74 years). Nine images with digital alterations in the gingival contour were used. One of the images served as an esthetic standard for the research (ideal image). The images were presented to the evaluators using slide show software (Microsoft PowerPoint 2013, Microsoft, California). Was used the Wilcoxon, Kruskal-Wallis and Mann-Whitney test. The level of significance was 5% ($\alpha = 0.05$). **Results:** Statistical differences were found between the esthetic perception of different age groups. The sample was composed only of lay people of three different age groups, and it was evident that the younger age group has a more accurate perception regarding changes in the gingival contour. **Conclusion:** The changes in the gingival contour perceived as less attractive were the changes between the central incisors. The younger age group had a more accurate esthetic perception in this study.

KEYWORDS

Periodontics; Gingival esthetics; Perception; Esthetics.

RESUMO

Introdução: A aparência facial tornou-se um fator importante de interação social. A percepção dos pacientes quanto as alterações promovidas pelo tratamento tem se tornado foco de estudo na atualidade. Dessa forma a proposta do presente estudo foi avaliar a percepção estética de leigos em relação às alterações estéticas periodontais. **Metodologia:** A amostra total foi composta por 180 indivíduos divididos em três faixas etárias diferentes (15-19, 35-44, 65-74). Foram utilizadas 09 imagens com alterações digitais no contorno gengival, sendo que uma delas serviu como padrão estético para a pesquisa (imagem ideal). As imagens foram apresentadas aos avaliadores usando o software de apresentação de slides (Microsoft PowerPoint 2013, Microsoft, Califórnia). Foi utilizado o teste de Wilcoxon, Kruskal-Wallis e Mann-Whitney. O nível de significância foi de 5% ($\alpha = 0,05$). **Resultados:** Foram encontradas diferenças estatísticas entre a percepção estética dos grupos de diferentes faixas etárias. Na amostra composta apenas por pessoas leigas de 3 diferentes faixas etárias, ficou evidente que a faixa etária mais jovem tem uma percepção mais apurada em relação às alterações no contorno gengival. **Conclusão:** As alterações no contorno gengival percebidas como menos atraentes foram as alterações entre os incisivos centrais. A faixa etária mais jovem teve uma percepção estética mais precisa neste estudo.

PALAVRAS-CHAVE

Periodontia; Estética gengival; Precepção; Estética.

INTRODUCTION

In dentistry, esthetics has become a growing interest among patients, playing an important role in the clinical routine of dental surgeons. This is due to fact that the media explore the beauty of perfect smiles, relating them to health and physical and mental well-being [1].

Visual perception is a condition for appreciation of what is beautiful, and can readily detect what is out of harmony and balance [2, 3]. This fact creates a challenge for the professional, who must apply their knowledge in the elaboration of a scientifically adequate treatment plan, and at the same time, positively meet the esthetic expectations of the patient and obtain the observers' approval [2,4].

The appearance of gingival tissue plays an important role in the overall esthetic structure, especially in patients with a medium or high smile line [5]. The harmony between the color, texture, shape, and architecture of the gingival tissue is extremely important in the esthetic appearance of the smile [6]. Therefore, the goal of any professional who seeks not only return of the function but also esthetics is healthy periodontal tissue, with all its particularities and characteristics. That is the ideal to be achieved.

The gingival contour should have as reference the size of the anterior teeth. The limits of the gingival contours of the canines and central incisors should be at the same height and slightly higher than the upper lateral incisors. This ideal situation is Class I gingival height. Moderate variations related to this criterion are frequent. In Class II gingival height, the gingival contour of the lateral incisors is apical to the central incisors and canines [7]. This situation can be corrected orthodontically, with intrusive and/or extrusive movements of teeth. In cases of severe deformities, periodontal plastic surgery should be used in order to optimize the gingival contours for restorative treatment [8].

Facial appearance has become an important factor of social interaction. Through the media, culture, and the large amount of esthetic resources available today, esthetics has become necessary. It is possible to perceive a growing search for dental treatments to improve the esthetics of the smile. Hence the relevance of the theme, which consisted of evaluating the esthetic perception of lay people regarding esthetic periodontal changes.

METHOD

This is a cross-sectional study with 180 lay individuals of different age groups: 15-19, 35-44, and 65-74 years (n = 60) [9]. The distribution of the participants was similar between genders in order to obtain a good dispersion of the data in relation to the mean. The exclusion factors of the sample were individuals with vision problems, dental surgeons, and dentistry students.

An image of the smile of a 23-year-old female individual was used in the study. The image was obtained with a digital camera (Canon Rebel 60D, Tokyo, Japan) and digitally manipulated for gingival contour (Adobe-Photoshopsoftware-CS3 San Francisco, CA) [10]. This image was replicated nine times, and each image underwent intentional digital alterations in the gingival contour: 1) central incisors with gingival margin 1.5 mm above the lateral incisors and canines; 2) central incisors with gingival margin 3.0 mm above the lateral incisors and canines; 3) canines with gingival margin 2.0 mm above the central and lateral incisors; 4) canines with gingival margin 4.0 mm above the central and lateral incisors; 5) difference of 1.5 mm in the gingival margin of the central incisors; 6) difference of 3.0 mm in the gingival margin of the central incisors; 7) lateral incisors with a gingival margin 1.5 mm above the central incisors and canines; 8) lateral incisors with gingival margin 3.0 mm above the central incisors and canines; 9) central incisors with gingival margin at the same height as the canines, and lateral incisors slightly (1 mm) below (standard image).

For all the altered images, the standard tooth sizes and the actual size of the photograph were maintained so that the changes were made in actual millimeters. Only the gingival contour was changed.

The images were presented to the evaluators using slide show software (Microsoft PowerPoint 2013, Microsoft, California). After reading and signing the Informed Consent Form (ICF), the participants digitally viewed the images (on slides) while answering the questionnaire.

Initially, the nine digitally altered photographs were presented in a single image. The photographs were numbered in their lower right corner and arranged randomly. The objective of this initial evaluation was to verify if the evaluators could observe differences between the photographs (Image 1). If the answer was yes, they were asked to answer in the questionnaire the number of the photograph they liked the most and of the one they liked the least. After that, a second image was displayed, with the same digitally altered photographs in reverse order of presentation. Again, the evaluators were asked whether they noted differences between the photographs, and were asked to point out the photograph they liked the most and the one they liked the least (Image 2).

Subsequently, the nine photographs were presented individually. In this stage of evaluation, the evaluators assigned a grade to each photograph using a visual analog scale (VAS) 0-100 mm, where 0 represented not attractive, 5 represented attractive, and 10 represented very attractive [11,12]. The numeric value corresponding to each grade was transported to a Microsoft Excel 2013 (Microsoft, California, USA) file, followed by statistical analysis.

STATISTICAL PROCEDURE

The frequency of the answers given by the participants was compared using Fisher's exact test. The differences in the likability scores of each photograph in relation to the control photograph were tested using the Wilcoxon test. The differences between genders were tested by the Mann-Whitney test, and the effect of the age group on attractiveness was evaluated using the Kruskal-Wallis test. The comparisons between pairs were performed using the Mann-Whitney test. The level of significance was 5% ($\alpha = 0.05$). The data were tabulated and analyzed in IBM SPSS Statistics for Windows (IBM SPSS. 21.0, 2012, Armonk, NY: IBM corp.).

RESULTS

One hundred and eighty individuals, whose characteristics are shown in Table 1 participated in the study. The distribution of the participants was similar between genders and equal between age groups.

Table 1 - Characteristics of study participants

Variable	n	%
Gender		
Female	88	48.9
Male	92	51.1
Age group	60	33.3
15-19 years	60	33.3
35-44 years	60	33.3
65-74 years	60	33.3

Table 2 shows the perception of the study participants concerning the differences and preferences regarding the images presented. Most participants identified differences between the photographs of the two images presented. Photograph 6 of Image 1 and photographs 1 and 3 of Image 2 were chosen as the most attractive photographs by study participants. Photograph 2 of Image 1 and photograph 8 of Image 2 were pointed as the least attractive photographs.

Table 2 - Perception of the study participants concerning the differences and preferences regarding the images presented

Answers	Image shown to participants	
Gender		
Yes	171 (95.0%)	174 (96.7%)
No	9 (5.0%)	6 (3.3%)
Photograph that likes the most*		
Photograph 1	13 (7.2%)	53 (29.4%)
Photograph 2	1 (0.6%)	6 (3.3%)
Photograph 3	17 (9.4%)	49 (27.2%)
Photograph 4	24 (13.3%)	1 (0.6%)
Photograph 5	17 (9.4%)	10 (5.6%)
Photograph 6	49 (27.2%)	19 (10.6%)
Photograph 7	19 (10.6%)	17 (9.4%)
Photograph 8	8 (4.4%)	7 (3.9%)
Photograph 9	32 (17.8%)	18 (10.0%)
Photograph that likes the least*		
Photograph 1	18 (10.0%)	10 (5.6%)
Photograph 2	55 (30.6%)	22 (12.2%)
Photograph 3	9 (5.0%)	2 (1.1%)
Photograph 4	1 (0.6%)	5 (2.8%)
Photograph 5	24 (13.3%)	40 (22.2%)
Photograph 6	5 (2.8%)	18 (10.0%)
Photograph 7	13 (7.2%)	11 (6.1%)
Photograph 8	34 (18.9%)	62 (34.4%)
Photograph 9	21 (11.7%)	10 (5.6%)

*Answered only by the individuals who noticed differences between the photographs.

The associations tested indicated significant differences between genders (for Image 2) and age groups (for Images 1 and 2) only for the photo they liked the most (Figure 1). Individuals of the two older age groups (35-44 and 65-74) liked photograph 3 of Image 1 more than the younger age group (15-19) did; participants of the two younger age groups had a higher preference for photograph 6, compared to the older age group; participants in the 65-74 age group liked photograph 7 more than the 15-19 age group did (Figure 3A). Comparisons between genders showed that preference for photograph 3 of Image 2 was higher among males, while the preference for photograph 8 was higher among females (Figure 3B). Individuals in the younger age group liked photograph 1 of Image 2 more than the two older age groups did; the participants in the 35-44 age group had a higher preference for photograph 3, compared to the 15-19 and 65-74 age groups; participants in the 65-74 age group liked photograph 6 more than the 35-44 age group did (Figure 3C).

Figure 1 - Image 1- Photographs presented to evaluate if the evaluators could observe differences between the photographs; Image 2- Same photographs presented in Image 1 in modified order.

Figure 2 - Evaluated digitally altered photographs. A) central incisors with gingival margin 1.5 mm above the lateral incisors and canines; B) difference of 3.0 mm in the gingival margin of the central incisors; C) canines with gingival margin 2.0 mm above the central and lateral incisors; D) lateral incisors with a gingival margin 1.5 mm above the central incisors and canines; E) central incisors with gingival margin 3.0 mm above the lateral incisors and canines; F) central incisors with gingival margin at the same height as the canines, and lateral incisors slightly (1 mm) below (standard image).G) difference of 1.5 mm in the gingival margin of the central incisors; H) canines with gingival margin 4.0 mm above the central and lateral incisors; I) lateral incisors with gingival margin 3.0 mm above the central incisors and canines.

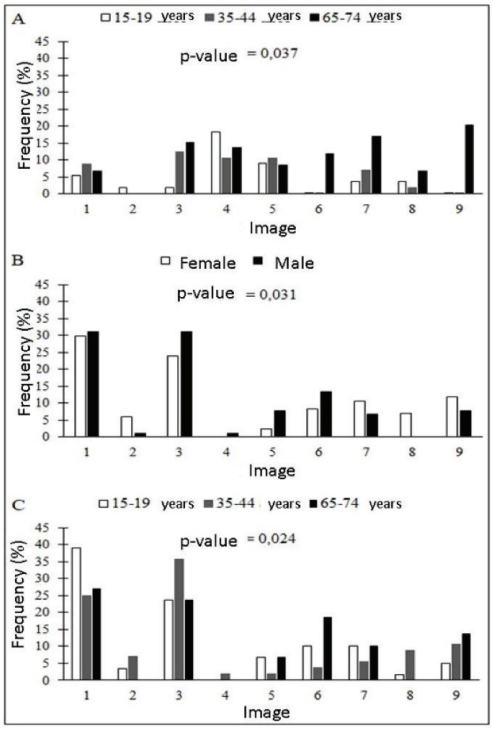

Figure 3 - Most liked photograph, by gender and age group. A, Image 1; B and C, Image 2.

Table 3 - Likability scores (means ± standard deviations) given by study participants to photographs.

Photograph	Sex		p-value*
	Female	Male	
Photograph 1	6.40 ± 1.81†	6.89 ± 1.51†	0.076
Photograph 2	4.82 ± 2.16†	4.84 ± 1.91†	0.692
Photograph 3	6.50 ± 1.80†	6.98 ± 1.56†	0.062
Photograph 4	7.38 ± 1.67	7.85 ± 1.25†	0.064
Photograph 5	5.94 ± 2.32†	5.71 ± 1.94†	0.713
Photograph 6 (control)	7.63 ± 1.67	8.07 ± 1.40	0.032
Photograph 7	6.69 ± 1.62†	7.17 ± 1.60†	0.007
Photograph 8	5.22 ± 2.34†	5.96 ± 2.01†	0.012
Photograph 9	6.28 ± 2.36†	6.14 ± 2.10†	0.590

* Mann-Whitney test; † statistically different from the control photograph (Wilcoxon test).

The means of the grades given to the photographs, by gender, are shown in Table 3. With the exception of photograph 4, women gave lower scores to all other photographs in relation to control photograph (photograph 6). Men considered that all photographs were less attractive than the control photograph. Comparisons between genders for each photograph indicated that men gave higher scores to photographs 6, 7, and 8. There was no difference between genders in the scores given to photographs 1, 2, 3, 4, 5, and 9.

The means of the grades given to the photographs, by age group, are shown in Table 4. Participants in the 15-19 age group considered that all photographs were less attractive than the control photograph. To individuals of the two older age groups, only photograph 4 did not differ from the control photograph in terms of likability. Comparisons between age groups for each photograph indicated that the grades given to photographs 1, 2, and 8 were progressively higher in the older age groups. Compared to participants in the 15 -19 age group, the two older age groups (35-44 and 65-74) gave higher scores to photographs 3, 5, and 7, but with no differences between groups. For photograph 9, there was difference only between the 15-19 and 65-74 age groups, with the respondents from the older age group giving higher scores in relation to the younger age group.

Table 4 - Likability scores (means ± standard deviations) given by study participants to photographs

Photograph	Age group (years)			p-value*
	15-19	35-44	65-74	
Photograph 1	5.86 ± 1.86†a	6.78 ±1.35†b	7.40 ± 1.41†c	< 0.001
Photograph 2	3.81 ± 1.89†a	4.92 ± 1.98†b	5.77 ± 1.74†c	< 0.001
Photograph 3	6.01 ± 2.06†a	7.02 ± 1.32†b	7.22 ± 1.36†b	0.001
Photograph 4	7.21 ± 1.78†	7.77 ± 1.19	7.87 ± 1.35	0.055
Photograph 5	4.98 ± 2.34†a	6.01 ± 2.10†b	6.49 ± 1.63†b	< 0.001
Photograph 6 (control)	7.83 ± 1.73	7.93 ± 1.24	7.81 ± 1.66	0.996
Photograph 7	6.25 ± 1.96†a	7.27 ± 1.17†b	7.26 ± 1.44†b	0.001
Photograph 8	4.49 ± 2.26†a	5.79 ± 1.92†b	6.51 ± 1.95†c	< 0.001
Photograph 9	5.57 ± 2.27†a	6.16 ± 2.37†ab	6.89 ± 1.85†b	0.002

* Kruskal-Wallis test ([a, b, c] distinct horizontal letters indicate statistical difference by the Mann-Whitney test); † statistically different from the control photograph (Wilcoxon test).

DISCUSSION

The gingival phenotype is of great importance in a professional analysis, since gingival characteristics like alveolar contour, thickness, and width are a reflection of the underlying bone tissue [9]. Periodontal structures as a whole may be modified by a variety of factors, such as traumatic, chemical, bacteriological, or iatrogenic changes, which can transform the structures' appearance and health condition, compromising the achievement of satisfactory esthetic and functional results [10].

The relation of the gingival contour with the anterior teeth is an important esthetic aspect, and should be judiciously analyzed through forced smile and also with the lips at rest [1, 6].

Manipulation of the gingival structures through the use of computer programs allows the analysis of the degree of influence of these morphological structures on the esthetic composition of the smile. Recently, many studies have been developed to evaluate the esthetic perception of the smile [10-16]. They are of fundamental importance for the decision making regarding the treatment to be performed, which should be in agreement with the patient's expectation. However, few studies have focused on the evaluation of the esthetics of periodontal tissue and its influence on the patient's smile.

Considering the importance of understanding the expectation and esthetic perception of patients, this study evaluated the esthetic perception of lay people of different age groups regarding gingival contour changes in smile.

The vast majority of respondents were able to identify difference between the photographs of the first two displayed images. The control photograph (ideal image), which presents the gingival contour of the lateral incisors slightly lower than the contour of the central incisors and canines, was chosen one of the most attractive by study participants, agreeing with other authors [14-16]. The photographs chosen as least attractive were those with a 3.0 mm difference in the gingival contour between the central incisors. A difference of 1.5 mm in the gingival contour of the central incisors (found in photograph 7 of Image 1 and photograph 4 of Image 2) was not perceived as not likable.

In a recent study, Betra et al. [13] concluded that lay people have a considerable negative perception of asymmetric gingival changes and optical color changes caused by black triangles and gingival inflammation and pigmentation. However, regarding the alterations in the gingival contour and zenith, there is less impact on the esthetics of the smile.

Duarte et al. [17] reported that if the patient presents gingival exposure when smiling, the alteration in the gingival contour becomes evident, and the closer to the midline the asymmetry is, the more contrasting it becomes, corroborating with the present study. Thus, according to the authors, the alteration in the gingival contour of the upper central incisors is more unsightly than in the lateral incisors and canines successively. This is in agreement with the present study, where the photograph with difference in the gingival contour of the central incisors was the participants' least favorite.

The younger age group gave higher grades to the control photograph compared to the older age groups, which makes evident, in this study, a more accurate esthetic perception

in younger individuals. This could be because we find greater periodontal normality in young individuals, making this, in turn, the ideal parameter. Retraction is the most prevalent sign of aging in the periodontium. This could mean that older evaluators may not mind retraction as much when evaluating the images.

It is of fundamental importance to establish a standard smile as a reference for the construction of harmonic smiles, avoiding that divergent and personal opinions compromise the esthetic results of treatments [18, 19]. These results show that for the restoration of the harmonious gingival contour during esthetic treatment, one can safely use the esthetic norms and principles recommended in the literature. After all, lay individuals of different age groups have perceptions similar to the esthetic standards of the smile.

Kokich et al. [20] carried out a study on the perception of lay people and dentists regarding smile esthetics, using photographs with esthetic changes such as crown width and length, gingival exposure, gingival contour, midline, and papilla loss. Regarding changes in the gingival contour, none of the three groups of evaluators noticed such changes as unsightly, and there was a concordance between the perceptions, which differs from the results found in the present study.

In addition, the gender variable was evaluated in the study, and through the analysis of the scores we observed that, in most of the photographs, it did not influence the results. Men considered that all photographs were less attractive than the control photograph (considered the ideal image), and women, with the exception of photograph 4, also gave lower scores to all the other photographs compared to the control photograph. This makes the result similar to that of some authors [20]. On the other hand, other studies [21-24] observed that this variable has an impact on esthetic perception, and that men are less critical than women when evaluating the smile.

Most studies use the comparison between lay people and professional experts regarding smile perception. In the present study, the sample consisted only of lay people of three different age groups, and it was evident that the younger age group has a more accurate perception regarding changes in the gingival contour. In light of this, it is of fundamental importance that the esthetic treatment be performed in an individualized manner, taking into consideration the desires, complaints, and expectations of each patient.

CONCLUSION

We conclude that the changes in the gingival contour that were perceived as less attractive by lay individuals are the changes between the central incisors. The younger age group gave greater grades to the control photograph, suggesting a more accurate esthetic perception among younger individuals. There was no statistical difference for the gender variable, demonstrating the equivalence of esthetic perception between men and women.

REFERENCES

1. Sarver DM, Ackerman MB. Dynamic smile visualization and quantification: Part 2. Smile analysis and treatment strategies. Am J Orthod Dentofacial Orthop 2003;124(2):116-27. doi: 10.1016/S088954060300307X
2. Bolas-Colvee B, Tarazona B, Paredes-Gallardo V, Arias-De Luxan S. Relationship between perception of smile esthetics and orthodontic treatment in Spanish patients. PLoS One 2018;13(8):e0201102. doi: 10.1371/journal.pone.0201102
3. Menezes EBC, Bittencourt MAV, Machado AW. Do different vertical positions of maxillary central incisors influence smile esthetics perception? Dental Press J Orthod 2017;22(2):95-105. doi: 10.1590/2177-6709.22.2.095-105.oar
4. Betrine Ribeiro J, Alecrim Figueiredo B, Wilson Machado A. Does the presence of unilateral maxillary incisor edge asymmetries influence the perception of smile esthetics? J Esthet Restor Dent 2017;29(4):291-97. doi: 10.1111/jerd.12305
5. Claman L, Alfaro MA, Mercado A. An interdisciplinary approach for improved esthetic results in the anterior maxilla. J Prosthet Dent 2003;89(1):1-5. doi: 10.1067/mpr.2003.5
6. Obradovic-Djuricic K, Kostic L, Martinovic Z. [Gingival and dental parameters in evaluation of esthetic characteristics of fixed restoratons]. Srp Arh Celok Lek 2005;133(3-4):180-7.
7. Ke XP, Wang CW, Sun HQ, Yang Y, Luo XY, Liu TS. A quantitative research on clinical parameters of gingival contour for anterior teeth esthetic analysis and design. J Esthet Restor Dent 2018. doi: 10.1111/jerd.12430
8. Zuhr O, Rebele SF, Cheung SL, Hurzeler MB, Research Group on Oral Soft Tissue B, Wound H. Surgery without papilla incision: tunneling flap procedures in plastic periodontal and implant surgery. Periodontol 2000 2018;77(1):123-49. doi: 10.1111/prd.12214

9. Suresh S, Mahendra J, Singh G, Pradeep Kumar AR, Thilagar S, Rao N. Effect of nonsurgical periodontal therapy on plasma-reactive oxygen metabolite and gingival crevicular fluid resistin and serum resistin levels in obese and normal weight individuals with chronic periodontitis. J Indian Soc Periodontol 2018;22(4):310-16. doi: 10.4103/jisp.jisp_108_18

10. Malhotra R, Grover V, Bhardwaj A, Mohindra K. Analysis of the gingival biotype based on the measurement of the dentopapillary complex. J Indian Soc Periodontol 2014;18(1):43-7. doi: 10.4103/0972-124X.128199

11. Kokich VO, Jr., Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. J Esthet Dent 1999;11(6):311-24. doi:

12. Malkinson S, Waldrop TC, Gunsolley JC, Lanning SK, Sabatini R. The effect of esthetic crown lengthening on perceptions of a patient's attractiveness, friendliness, trustworthiness, intelligence, and self-confidence. J Periodontol 2013;84(8):1126-33. doi: 10.1902/jop.2012.120403

13. Batra P, Daing A, Azam I, Miglani R, Bhardwaj A. Impact of altered gingival characteristics on smile esthetics: Laypersons' perspectives by Q sort methodology. Am J Orthod Dentofacial Orthop 2018;154(1):82-90 e2. doi: 10.1016/j.ajodo.2017.12.010

14. Pithon MM, Santos AM, Campos MS, Couto FS, dos Santos AF, Coqueiro Rda S, et al. Perception of laypersons and dental professionals and students as regards the aesthetic impact of gingival plastic surgery. Eur J Orthod 2014;36(2):173-8. doi: 10.1093/ejo/cjt020

15. Pithon MM, Santos AM, Viana de Andrade AC, Santos EM, Couto FS, da Silva Coqueiro R. Perception of the esthetic impact of gingival smile on laypersons, dental professionals, and dental students. Oral Surg Oral Med Oral Pathol Oral Radiol 2013;115(4):448-54. doi: 10.1016/j.oooo.2012.04.027

16. Pithon MM, Santos AM, Couto FS, da Silva Coqueiro R, de Freitas LM, de Souza RA, et al. Perception of the esthetic impact of mandibular incisor extraction treatment on laypersons, dental professionals, and dental students. Angle Orthod 2012;82(4):732-8. doi: 10.2319/081611-521.1

17. Duarte CA, Pereira CA, Castro MVM. Cirurgia periodontal: pré-protética, estética e peri-implantar. In: Santos, editor. Cirurgia Periodontal Estética. São Paulo (SP); 2009. p. 341-406.

18. Aranha VP, Samuel AJ, Narkeesh K. Correct the smile of a child by neuromuscular facilitation technique: An interesting case report. Int J Health Sci (Qassim) 2017;11(2):83-84.

19. Trushkowsky R, Arias DM, David S. Digital Smile Design concept delineates the final potential result of crown lengthening and porcelain veneers to correct a gummy smile. Int J Esthet Dent;11(3):338-54.

20. Kokich VO, Kokich VG, Kiyak HA. Perceptions of dental professionals and laypersons to altered dental esthetics: asymmetric and symmetric situations. Am J Orthod Dentofacial Orthop 2006;130(2):141-51. doi: 10.1016/j.ajodo.2006.04.017

21. Flores-Mir C, Silva E, Barriga MI, Lagravere MO, Major PW. Lay person's perception of smile aesthetics in dental and facial views. J Orthod 2004;31(3):204-9; discussion 01. doi: 10.1179/146531204225022416

22. Geron S, Atalia W. Influence of sex on the perception of oral and smile esthetics with different gingival display and incisal plane inclination. Angle Orthod 2005;75(5):778-84. doi: 10.1043/0003-3219(2005)75[778:IOSOTP]2.0.CO;2

23. Kerns LL, Silveira AM, Kerns DG, Regennitter FJ. Esthetic preference of the frontal and profile views of the same smile. J Esthet Dent 1997;9(2):76-85.

24. Omar R, Tashkandi E, Abduljabbar T, Abdullah MA, Akeel RF. Sentiments expressed in relation to tooth loss: a qualitative study among edentulous Saudis. Int J Prosthodont 2003;16(5):515-20.

Matheus Melo Pithon
(Corresponding address)
Av. Otávio Santos, 395, sala 705, Centro Odontomédico Dr. Altamirando da Costa Lima, Bairro Recreio, CEP 45020-750 – Vitória da Conquista – Bahia, Brazil.
E-mail: matheuspithon@gmail.com

Date submitted: 2019 Aug 23

Accept submission: 2019 Nov 14