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Pleasantness of facial profile and its correlation with soft tissue cephalometric parameters: Perception of orthodontists and lay people

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ABSTRACT

Objective: This study was aimed to evaluate the perception of orthodontists and of lay people about the facial profile and its possible correlation with cephalometrics parameters. **Materials and Methods:** A total of 20 evaluators were divided into two groups (10 orthodontists and 10 people with no relation to such area – lay people). They were asked to evaluate the photographs of 25 young males and of 25 young females, aged 17–24-year-old (mean age of 22.3 years, standard deviation 2.41 years). Photographs were randomly arranged in a photo album. The evaluators rated each photograph by means of a scale ranging from "good" to "deficient" based on the pleasantness of their facial profile. Nasolabial angle, Holdaway's H-line and the distance from H-line to nose tip were measured, in order to verify a possible relation between these soft tissue profile cephalometric measurements and the subjective ratings. **Results:** The kappa statistics test showed a concordance of 0.23 among orthodontists and 0.24 among lay people. Regarding the perception of orthodontists and lay people on facial profile, no significant divergence could be detected. For the correlation between cephalometric parameters and subjective ratings, there was a statistically significant correlation between the measures H and H-nose and the rating ascribed to the profile. **Conclusions:** It was concluded that smaller the difference from the normal cephalometric pattern, the higher was the rating given to the profile, demonstrating an important relation between subjective and objective criteria.

Key words: Cephalometrics, esthetics, form perception, orthodontics

INTRODUCTION

Angle, the father of modern orthodontics, has stated that beauty, balance, and harmony are the important points to be considered in facial profiles.[1] Interestingly, harmonious faces do not necessarily are accompanied by a normal occlusion.[2] Facial beauty depends on several factors, such as personal opinion, cultural patterns, media influence, and racial or ethnical factors.[3] Thus, the facial analysis is currently used as an essential additional examination in the orthodontic treatment plan.[4-6]

The soft tissue cephalometric analysis is widely employed in orthodontics to evaluate facial harmony and aesthetics.[7-9] This analysis uses several measurements, such as nasolabial angle (NLA) – formed by the lower base of the nose

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and by the upper lip,[10] the H-line – tangent to the most salient point of the chin and upper lip, and the H angle – formed by the intersection of the H-line with the NaPog line.[11] However, soft tissues may not always follow bone tissue morphology in an absolute ratio.[12] Thus, considering the importance of facial harmony on diagnosis and orthodontic treatment planning, as well as the widespread use of cephalometric measurements for similar goals, this study had the purpose of verifying the perception of lay people and orthodontists on facial profiles, as well as determining whether the subjective ratings are correlated with some cephalometric soft tissue parameters.

MATERIALS AND METHODS

This study was approved by the Ethics Committee of Universidade Metodista de São Paulo, with protocol number 376080-10.

The rating material consisted of photographs of 25 young male and 25 young female Caucasians, aged between 17 and 24 years (mean age of 22.3 years, standard deviation [SD] 2.41 years), with no teeth absences and without previous orthodontic treatment, craniofacial malformations or odontogenic anomalies. All individuals accepted to participate in the study, and signed a consent form that explained about the objectives and examinations related to the study, authorizing the release of facial photographs for teaching and research purposes.

The photographs were taken with a Sony digital camera (model FD95, Tokyo, Japan), with macro lens and digital zoom (×20), at a distance of 1.5 m with ×1 adjustment of the macro lens to the individual face. All patients were asked to stay at a natural head position as previously described,[1] against a blue background. Patients should stay with teeth in maximum intercuspation and with lips at rest.

The sample consisted of 20 evaluators of both sexes, previously instructed and divided into two groups: Ten orthodontists (five men and five women) (mean age of 31.2 years, SD 2.65 years); and 10 lay people (five men and five women) (mean age of 28.1 years, 2.28 years). Pictures were randomly arranged in a photo album and showed to the evaluators. After viewing each picture for 30 s, participants were asked to subjectively rank each photograph and make a marking on the corresponding point of a 20 cm scale ranging from "good" to "deficient" [Figure 1], according

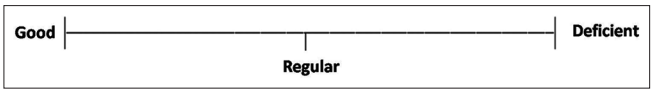

Figure 1: Scale for the measurement of the pleasantness degree

to their perception on facial pleasantness. For each photograph, the distances from point "deficient" to the markings made by the evaluators were measured with a caliper, and this was considered the score assigned to the profile in question.

To establish the existence of a correlation between cephalometrics and the ratings given by the evaluators, some cephalometric parameters were selected (NLA, Holdaway's H-line, and the distance from H-line to the nose tip). These cephalometric variables were chosen due to its large use in treatment diagnosis, as they are part of many popular soft tissue cephalometric protocols.

The H angle is formed by the intersection of the H-line with the NaPg line, and is used to measure the prominence of the upper lip in relation to the facial profile.[10] The H-line-nose is the linear distance measured from the H-line to the tip of the nose, with normal values ranging from 9 to 11 mm. According to Holdaway,[2] a pleasant profile is recognized when the H-line passes through the center of the nose. The NLA is formed by the lower base of the nose (Sn-Co) and the upper lip (Sn-Ls). In a harmonic profile, it ranges from 90° to 110°.[13,14] Graphic representations of these parameters are shown in Figure 2.

The score values (scale from 0 to 20) between orthodontists and lay people were compared using the median scores for each photograph in each group and the nonparametric Wilcoxon test. Scores in the scale were grouped into three categories: Zero to six centimeter deficient, 7–13 cm regular, and 14–20 cm good. Kappa statistics was performed with a 95% confidence interval to check the concordance level between the two groups.

The relationship between the scores assigned to the profile and the cephalometric measurements was verified based on, how much each profile diverged from the normally accepted cephalometric measurements. Normal values were set as follows: H angle, 8°; H-line-nose – 10 mm; and NLA, 100°. Afterward, a Spearman correlation was estimated among scores and absolute differences from the normal values set for each cephalometric measurements.

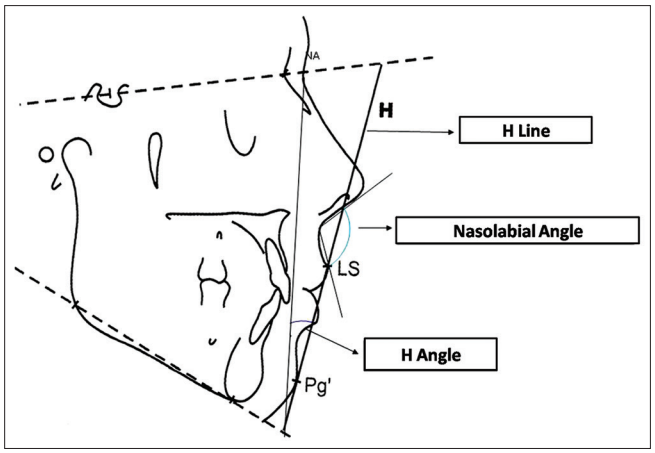

Figure 2: Anatomical sketch illustrating the H-line, the nasolabial angle, and the H angle

RESULTS

The kappa statistics showed a concordance of 0.23 among orthodontists (confidence interval [CI] 95%: 0.19–0.26) and 0.24 among lay people (CI 95%: 0.19–0.28). Table 1 lists the comparison between the scores assigned by orthodontists and lay people, evidencing a nonsignificant difference.

The comparison between the classifications of orthodontists and lay people by means of kappa statistics is presented in Table 2. The kappa value was 4.7, showing a concordance of 68% between the two groups of evaluators. Table 3 indicates the correlation among scores and absolute differences from the normal values set for each cephalometric measurement. There was found a significant correlation among H-line and H-line-nose values, and the score of pleasantness assigned to the profiles.

Table 1: Comparison between the scores assigned by Orthodontists and Lay people

Evaluators	Mean	Median	1st quartile	3rd quartile	*P*
Orthodontists	7.7	8	3	12	0.077ns
Lay people	7.0	6	2	11	

ns: Non-significant difference

Table 2: Comparison between the classifications of Orthodontists and Lay people

Orthodontists	Lay people			
	Deficient	Regular	Good	Total
Deficient	21	2	1	24
	42%	4%	2%	48%
Regular	5	10	5	20
	10%	20%	10%	40%
Good	0	3	3	6
	0%	6%	6%	12%
Total	26	15	9	50
	52%	30%	18%	100%

% concordance=68%; kappa=0.47

Table 3: Correlation between the scores assigned to the profile and the absolute difference for the mean cephalometric pattern of the evaluated measurements

Evaluators	Correlation	*R*	*P*
Orthodontists	Score x H	−0.46	0.001*
	Score x H- Nose	−0.54	<0.001*
	Score x NLA	0.10	0.487ns
Lay people	Score x H	−0.45	0.001*
	Score x H-Nose	−0.57	<0.001*
	Score x NLA	−0.04	0.799ns

*Significant correlation, ns: Non-significant correlation, NLA: nasolabial angle

DISCUSSION

This study has verified a possible correlation between selected cephalometric parameters and the perception of lay people, and orthodontists on facial profile pleasantness. A previous work on facial pleasantness failed to establish any such correlation with cephalometric results.[15] On the other hand, another study[16] observed that cephalometrics correlated with facial pleasantness but highlighted that the patient normally seeks the orthodontist to solve dental, not facial problems.[17] In general, several professionals meet their patients' expectations by correcting their teeth while facial disharmonies are sometimes underrated.

Small values in the kappa test suggest a fair level of agreement among evaluators within the same group (0.23 for orthodontists and 0.24 for lay people), supporting the idea that beauty is indeed subjective.[15] Similar levels of agreement were found by other authors,[18] but another survey[19] registered better agreement concerning facial pleasantness. Even though the present study has investigated soft tissue profile exclusively, we can agree with the thoughts of Altemus,[20] who believes beauty is a purely personal issue. Altogether, our findings suggest that the evaluators – lay people and orthodontists – have a rather individualized way of defining pleasantness of soft tissue profiles.

After analyzing photograph ratings between lay people and orthodontists, a nonsignificant divergence was detected [Table 1], which had already been detected[21] but contradicted another study that verified a significant difference between the opinion of orthodontists and lay people.[22] Moreover, the kappa value, when considered the set of orthodontists

and the set of lay people, was higher (0.47) than individual values within both groups of evaluators. This probably indicates that, at the individual level, facial pleasantness is a concept even more subjective than it is, when compared against group consensus. The small age difference between orthodontists and lay people may increase their concordance level.

There was a statistically significant correlation between H-line and H-line-nose values and the score of pleasantness assigned to the profiles. The statistics shows that the lower the difference from the normal profile, the higher the score assigned to that same profile. This correlation of subjectivity with cephalometrics suggests that the first may assist in clinical practice and clinical facial analysis. Nevertheless, the measure NLA had no relationship with the assigned scores [Table 3]. This can be due to variation of nose morphology that allows greater variations of NLA values without esthetic compromise.

Given the shortcomings of this study, further research is suggested to investigate associations of different facial structures with the pleasantness of facial profile, in view of the quest for excellence in orthodontic treatment planning.

CONCLUSIONS

In short, no significant divergence was found regarding the perception of orthodontists and lay people on facial profiles. On the other hand, there was a significant correlation between the parameters H-line and H-line-nose and the scores assigned to the profiles. The lower the difference from the normal values, the higher the scores assigned to that same profile. The parameter NLA had no correlation with the assigned scores.

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Conflicts of interest
There are no conflicts of interest.

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