

Esthetic Evaluation of Smiling Profiles In Relation To Incisor Labolingual Inclination And Maxillary Anteroposterior Position – A Photographic Study

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Abstract

Aim: To test the null hypothesis that there is no effect of labiolingual inclination of maxillary incisor and anteroposterior position (AP) of maxilla on smiling profiles in young adults.

Method: Facial smiling profile of a young female adult with class I dental and skeletal malocclusion was selected as a subject. Subject’s repeatable smiling profile photograph was altered with photoshop S2(version 9.0) digital imaging program to obtain 3 series comprising 15 smiling profile photographs. In first step of alteration of photographs only one parameter was changed i.e, anteroposterior position (AP) of maxilla in horizontal plane. In the next step each profile photograph divided in to 3 subgroups. The sample of individuals rating these pictures comprised 25 orthodontists, 25 prosthodontists, 25 senior dental students and 25 laypeople who had no previous orthodontic treatment done. The Kruskal-Wallis

test was used to compare the rankings of the images between the 4 professional groups

Results: Significant differences ($p < 0.001$) were detected when ratings of each photograph in each of individual facial type was compared.

Conclusion: The hypothesis was rejected. The aesthetic perception of labiolingual inclination and anteroposterior position differ in different groups and which plays a key role in formulating different treatment plans for different facial patterns.

Introduction

Facial esthetics, in particular profile esthetics, is one of the motives that encourage most patients to seek orthodontic care.¹⁻³ Although orthodontic treatment is based mainly on occlusal relationships, great attention has recently been paid to obtaining optimal facial profile esthetics and soft tissue–hard tissue relationship.⁴ And orthodontic treatment that adheres strictly to cephalometric standards

does not necessarily meet esthetic principles. Although the public is generally consistent with regard to what it believes constitutes an attractive face. Thus, it seems worthwhile to clearly understand the social preferences related to dentofacial attractiveness and smile “pleasantness.”⁵

Evaluating the face in smiling profile is an integral part of a complete orthodontic diagnosis. Maxillary incisor labiolingual inclination and maxillary anteroposterior (AP) position have a key effect on the appearance of the smiling profile.⁶

Materials and method

Sample Selection

After screening a group of young female adults between 18-25 years age group, with a thorough clinical examination and cephalometric examination. One of the subject who met all the criteria and willing to participate in the study is taken with informed consent.

In respect to gender, we opted for female patient as they are the most representative people in the orthodontic treatment. A written consent was obtained from the participant prior to conducting the study.

A. Inclusion Criteria

- a. Subject with good physical, oral and mental health.
- b. Intact dentition with no missing teeth.

B. Exclusion Criteria

- a. Impacted Or unerupted teeth
- b. Retained deciduous teeth in any arches
- c. Missing permanent teeth
- d. Marked jaw asymmetries

Materials

1. Mouth mirror
2. Probe
3. Lateral cephalogram
4. Ruler
5. Adobe Photoshop Cs

Method

A Right lateral profile photograph with the patient in blue background at a distance of 1.5 m from the camera under standard conditions. To standardize the photograph, the subject is asked to sit down, with pupillary plane parallel to the ground and the image was taken with a neutral facial expression. The ruler was used as a guide for computer aided alterations to quantify hard and soft tissue alterations. Then the image was altered using commercially available image editing software programme (Adobe Photoshop Cs).

Thus overall, one subject with three different growth patterns with five different positions of labial incisors. A total of 15 photographs were taken for evaluation. Then each series of images was printed separately on a digital royal paper (Kodak), with a hp photo smart printer in an A4 sheet. The rating is done using a likert-type scale by about 100 raters, 25 orthodontists, 25 Prosthodontist, 25 senior dental students and 25 laypeople who had no previous orthodontic treatment done.

All raters were asked to evaluate the photographs of each set at the same session and score them from 1-5, where

- 1- Very unattractive
- 2- Unattractive
- 3- Neither attractive nor unattractive
- 4- Very attractive
- 5- Attractive

The questionnaire included other questions like age, sex, and profession of the evaluators.

The statistical analysis is done using statistical package for social sciences.



Fig: 1a



Fig: 1b

Image Alteration

- The subject's repeatable smiling profile photograph was altered with the Photoshop CS2 (version 9.0) digital imaging program to obtain four series comprising 15 smiling profile photographs.
- The 100-mm ruler above the subject's head was used to quantify hard and soft tissue movements and was later digitally removed to give the subject a normal appearance.
- During the first alteration step, only 1 parameter was changed: the anteroposterior position of the maxilla.



Fig: 2a



fig: 2b



fig: 2c

- By changing the position of the maxilla in the horizontal plane relative to the true vertical line that crosses the glabella 3 profiles were created (retruded, normal, and protruded seen in fig 2a,2b,2c respectively).

- To focus on the sagittal aspect of the facial profile, the vertical height of the constructed face was kept constant.
- In the next step, each profile group was further divided into 3 subgroups.
- The maxillary incisor labiolingual inclination was altered while FA was kept unchanged on GALL, as described by Andrews and Andrews.⁷



1A 1B 1C 1D 1E



2A 2B 2C 2D 2E



3A 3B 3C 3D 3E

Statistical Analysis

- All statistical analyses were carried out using the Statistical Package for Social Sciences.
- The mean rank score and standard deviation for each photograph were calculated based on the scores given by each rater.
- Additionally, the mean rank score and standard deviation of each photograph were calculated independently based on sex and professional group.
- The Kruskal-Wallis test was used to compare the rankings of the images between the 4 professional groups.

Table 1

Image	Situation
1A	Retruded mandible with 10 of labial incisor inclination
1B	Retruded mandible with 5 of labial incisor inclination
1C	Retruded mandible with normal incisor inclination
1D	Retruded mandible with 15 of palatal incisor inclination
1E	Retruded mandible with 10 of palatal incisor inclination
2A	Normal mandible with 10 of labial incisor inclination
2B	Normal mandible with 5 of labial incisor inclination
2C	Normal mandible with normal incisor inclination
2D	Normal mandible with 15 of palatal incisor inclination
2E	Normal mandible with 10 of palatal incisor inclination
3A	Protruded mandible with 10 of labial incisor inclination
3B	Protruded mandible with 5 of labial incisor inclination
3C	Protruded mandible with normal incisor inclination
3D	Protruded mandible with 5 of palatal incisor inclination
3E	Protruded mandible with 10 of palatal incisor inclination

Table 2

Image	Mean	SD	Chi-square value	P-value
1A	1.30	0.77	6.89	0.06
1B	1.38	0.82	7.18	0.05
1C	2	0.70	16.91	<0.01
1D	1.25	0.77	18.7	<0.01
1E	1.20	0.89	16.7	<0.01
2A	2	0.63	4.89	0.15
2B	1.98	0.66	5.02	0.17
2C	1.78	0.54	14.77	<0.01

2D	2.28	1.002	1.58	0.66
2E	2.11	1	1.44	0.63
3A	0.66	0.57	2.51	0.43
3B	0.68	0.62	2.63	0.45
3C	0.78	0.77	10.63	<0.01
3D	0.433	0.63	15.4	<0.01
3E	0.435	0.56	14.9	<0.02

Table 3

Image	Orthodontists	Prosthodontists	Dentists	Laypeople	P-value
1A	0.73±0.46	1.00±0.65	1.80±1.26	2.02±0.93	0.06
1B	0.71±0.47	0.90±0.63	1.76±1.15	1.98±0.90	0.05
1C	1.33±0.49	1.80±0.68	2.47±0.64	2.40±0.99	<0.01
1D	0.93±0.88	0.87±0.83	1.53±1.13	1.67±0.98	<0.01
1E	0.91±0.79	0.88±0.78	1.52±1.08	1.63±0.96	<0.01
2A	2.77±0.80	2.54±0.46	2.66±0.64	2.53±0.74	0.15
2B	2.93±0.79	2.73±0.44	2.87±0.61	2.60±0.72	0.17
2C	2.93±0.88	2.33±0.49	2.27±0.46	2.87±0.35	<0.01
2D	2.53±1.30	2.60±0.99	1.80±0.86	2.20±0.86	0.66
2E	2.51±1.25	2.55±0.95	1.76±0.85	2.12±0.82	0.63
3A	0.09±0.26	0.91±0.59	0.89±0.88	0.77±0.77	0.43
3B	0.07±0.27	0.93±0.51	0.93±0.81	0.80±0.70	0.45
3C	0.40±0.51	0.60±0.83	1.07±0.46	1.07±1.28	<0.01
3D	0.27±0.41	0.47±0.45	0.60±0.68	0.40±0.81	<0.01
3E	0.22±0.46	0.42±0.52	0.56±0.74	0.35±0.83	<0.02

Results

In the profiles with a retruded mandible, image 1C,1D,1E was reported as the most attractive by all groups; image 1A, (the most proclined incisors) was the least attractive image for all groups.

In the profiles with an orthognathic mandible, image 2C was reported most attractive by all groups, image 2A, 2B (the most proclined incisors) was the least attractive image for all groups.

In the profiles with protruded mandible, all groups selected image 3C (normal incisor inclination) as the most attractive. A significant difference in the ranking of image 3A (most proclined incisors) was found between the different groups of raters.

Discussion

In this study, we developed a series of facial profile photographs based on the original ideal profile of a female subject to be evaluated by different groups of dental professionals, dental students, and laypeople. Altering the image of 1 subject was done to eliminate the effect of background facial attractiveness. Wagner et al⁸ showed this as a useful method in studying variations in dental appearance. In this study, color profile photographs were used, since it has been claimed that color photographs convey facial details more realistically than silhouettes and profile drawings. We used the image of an adult to remove any confounding factors such as growth potential and growth-related profile changes.

In our study, with the maxilla in a normal position, the 2 lingual inclinations and 2 labial inclinations were rated differently by the different groups.

The orthodontists and Prosthodontist preferred the 2 labial inclinations, and the students preferred the 2 lingual inclination. But the laypeople preferred the normal inclination.

This showed that in the normal maxillary position, there are preferences among orthodontists and prosthodontists toward a more labial inclination and a preference toward a more lingual inclination by dental students compared with the other groups.

In the study of Ghaleb et al⁹, dentists, orthodontists, and laypeople preferred an increase of 5° in a labial direction in the smiling profile; this agrees with the ratings of the orthodontic and prosthodontic panels in our study.

In the study of the Cao et al¹⁰, orthodontists rated the smiling profile with 5° of lingual inclination as the most attractive. This is different from our study.

But Cao et al¹⁰ reported the 10° labial inclination as the least attractive, whereas the profiles with 10° of lingual inclination were considered relatively esthetic. This correlates with our study.

The differences in the results might be attributed to the sex of the model, the methods of rating (visual analog scale vs Likert-type scale), the landmarks used for stabilization of the anteroposterior position of the maxillary incisor, and the different populations from which the judges were chosen and social environment Schlosser et al⁵ reported a higher level of acceptance for dental protrusion than for retrusion among orthodontists. They reported that orthodontic training did not significantly affect the preference pattern of the raters; this does not agree with the results of our study.

Unlike our study, in the study by Schlosser et al, the positions of the incisors were altered, and the incisor inclination was kept constant in the different profiles.

Although in this study we assessed the effects of maxillary position on the preferred incisor inclination, the fact that these results were obtained from 1 photograph must be taken into account. Several intrinsic and extrinsic factors can play roles in the perception of facial attractiveness and can hypothetically affect the final outcomes of the study.

Conclusion

A maxillary incisor that is upright or in slight lingual inclination is preferable, in spite of the AP position of the maxilla. Labial inclination of the upper incisors could easily ruin a pleasing smiling appearance. It might be concluded that for maxillary retrusion and protrusion, less labial or lingual inclination is more preferable in almost all groups.

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