

Esthetic perception towards different combinations of facial contours and upper incisor shape

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Abstract

Aim: The aim of this study was to assess the esthetic perception of adults with primary, secondary and higher education and recent dental graduates towards different combinations of facial contours and upper central incisor shapes. **Methods:** Photographs of 6 individuals with square, tapered and ovoid facial contours (2 per type) were modified to have the 3 different types of tooth shapes (square, tapered and ovoid) in each facial contour (total of 18 photographs). The 195 participants rated each photograph using visual analogue scales. Comparison between groups was performed using the Chi-square t-test ($\alpha=0.05$).

Results: No statistically significant differences ($p>0.05$) were found in the esthetic perception towards the frontal facial outline and upper incisor shape by participants' educational level. In addition, the shapes of teeth perceived as the most esthetically pleasing were not always similar to the form of frontal facial outline evaluated. **Conclusions:** No general agreement was found in the esthetic perception towards the frontal facial outline and upper incisor shape by educational level. Dentists tend to prefer ovoid shape tooth for almost all frontal facial outline.

Keywords: esthetic perception, facial contour, dental shape

Introduction

Esthetics has great importance in restorative dentistry becoming synonymous of natural, healthy, and harmonious appearance¹⁻². An attractive smile increases an individual's acceptability to society and improves interpersonal relationships. Dentists and patients prefer equilibrated smiles with uniform teeth and a straight or mildly convex incisal plane³. This tooth relationship can be affected by several factors such as shape, size, color, texture, symmetry, and proportion⁴. Knowledge of these details can satisfy the needs of every patient. Beauty is not absolute but rather extremely subjective and perception is determined by the senses, knowledge, ethnic background, and preferences of each individual⁵⁻⁶.

Regarding teeth shape, several methods have been used to predict the shape of the missing anterior teeth to facilitate the restoration and maintenance of the anterior segment⁷. In 1914, Williams⁸ established that to restore the upper central incisors they should be related to the facial contour. In this fact, he classified both teeth and facial contours into three categories: square, tapered and ovoid. Studies have proven the existence of a relationship between upper central incisor shape and facial contour³ while other studies have proven the contrary^{4,7,9-10}. However, the majority of these studies determined this relationship by using photographs of the facial contours and comparing them to the intraoral photographs of the upper central incisor. Brisman³ has

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demonstrated that judgments on dental esthetics differed when the teeth shape is assessed jointly with the facial contours, indicating an influence of the facial presentation on the esthetic perception.

On the other hand, several studies have reported that the level and type of education can influence people's esthetic perception. Anderson et al.¹¹ evaluated the esthetic perception of tooth shapes when smiling and found discrepancies between the preferences of dental professionals and lay persons. Brisman³ stated that the patients' and dentists' opinions differ when evaluating images and photographs of upper central incisor variations in shape, symmetry and proportion. However, no study has explored the influence that the level and type of education can have on people's esthetic perception. To fill this gap in knowledge, a study was set out to compare the esthetic perception of adults with primary, secondary and higher education and recent dental graduates towards different combinations of facial contours and upper central incisor shapes.

Material and methods

Study sample

One hundred and ninety five adults participated in the survey. The study sample included 47 subjects with primary, 50 with secondary and 50 with higher education as well as 48 recent dental graduates (>1 year) from the Universidad Peruana Cayetano Heredia. This was a convenience sample selected from the patients attending the Dental Clinic of the Universidad Peruana Cayetano Heredia (Lima, Peru). The Institutional Review Board at the Universidad Peruana Cayetano Heredia approved the study protocol. Furthermore, subjects signed a written consent agreeing their voluntarily participation in the survey.

Data collection

The survey instrument consisted of 6 black-and-white photographs (3 of each gender). Each photograph included an individual presenting a square, tapered and ovoid facial contour. Subjects photographed did not present any severe facial or dental alterations. Standardized frontal full dental smiling photographs (28 x 20 cm²) were taken of each subject such that the upper central incisors and up to 2 mm of gingiva were shown. Teeth in each photograph were modified using Adobe Photoshop 7.0 (Adobe Systems Incorporated, San Jose, CA, USA) so as to obtain 3 different types of tooth shapes (square, tapered and ovoid) for each facial contour. A total of 18 photographs were included in the final version of the survey instrument, which were randomly arranged into a booklet. Therefore, each page in the booklet showed the 3 photographs of the same individual presenting the 3 different incisal shapes (Figures 1- 6).

During the survey, subjects were asked to select the most esthetically pleasing photograph from each set of 3 with the same facial contour. Overall, each subject provided 6 answers. They had 30 s to view and rate each set of photographs. A pilot evaluation was undertaken to determine the reliability of the instrument before the main survey. Ten individuals filled out the survey and, after 24 h, repeated it but with the photographs randomly rearranged to eliminate memory bias. The kappa value was 0.60, which is considered acceptable for studies on perception¹².

Statistical analysis

Groups were initially compared with regard to their gender distribution, using the Chi-square test, and their age, using the Kruskal-Wallis test. Thereafter, the esthetic perception towards the different combinations of facial contours and tooth shape was compared between educational groups using the Chi-square test ($\alpha=0.05$).



Fig. 1 - Female square facial contour set. Each photograph presents a different shape of upper central incisors.



Fig.2 - Male square facial contour set. Each photograph presents a different shape of upper central incisors.



Fig. 3 - Female tapered facial contour set. Each photograph presents a different shape of upper central incisors.



Fig.4 - Male tapered facial contour set. Each photograph presents a different shape of upper central incisors.



Fig. 5 - Female ovoid facial contour set. Each photograph presents a different shape of upper central incisors.



Fig. 6 - Male ovoid facial contour set. Each photograph presents a different shape of upper central incisors.

Results

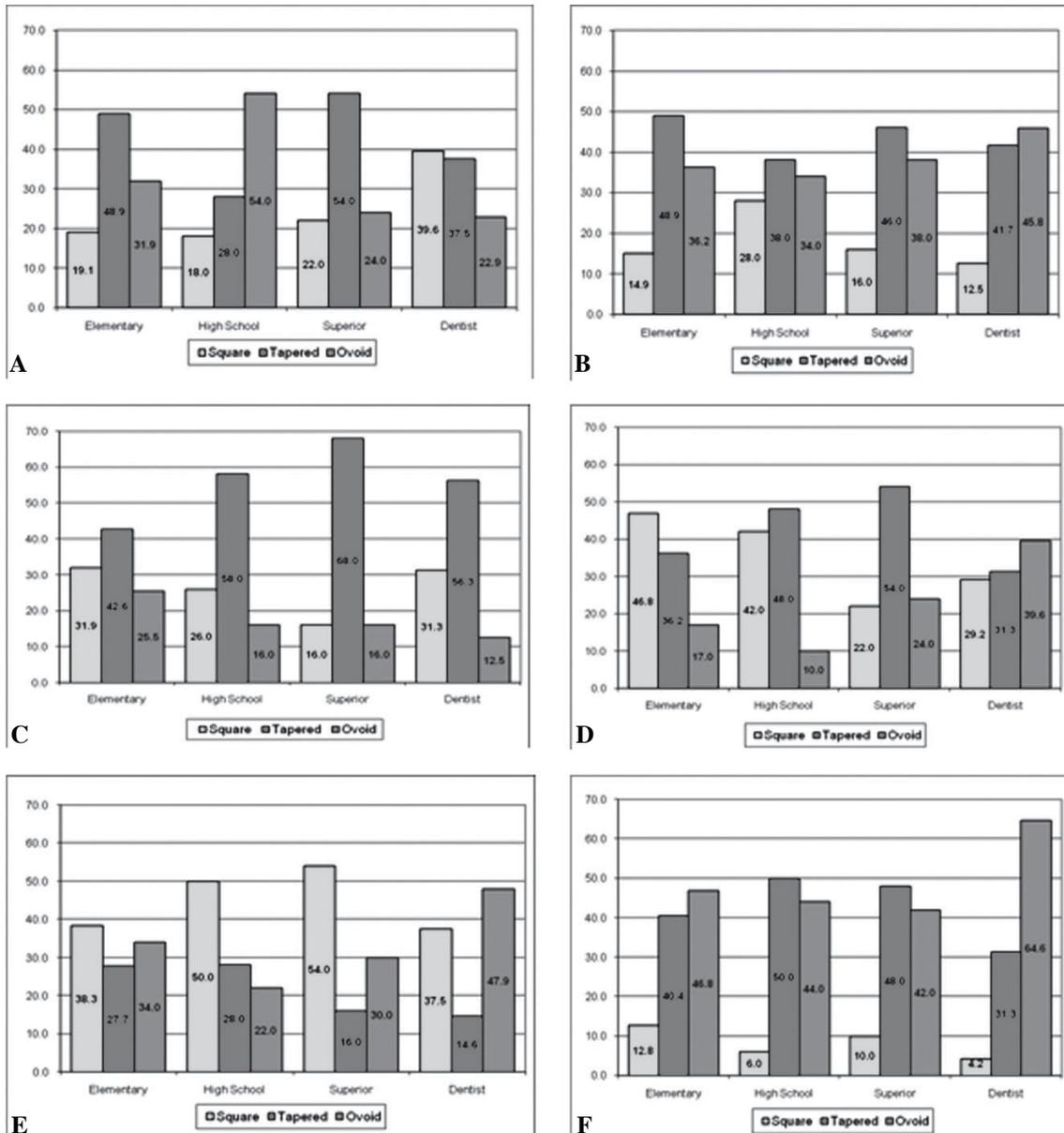
Groups were not statistically different by their gender distribution ($p=0.080$), but were statistically different by age ($p<0.001$). The group with elementary education was the oldest group (46.60 ± 11.5 years),

followed by the groups with higher education (33.10 ± 10.11 years), high school education (28.48 ± 8.64 years) and dental graduates (23.79 ± 2.21 years), respectively.

Table 1 illustrates the esthetic perception towards the different combinations of tooth shape and facial contour in the four groups compared. For the square female facial contour (A), subjects with elementary education and dental graduates preferred the ovoid tooth shape (46.8 and 64.6%, respectively) and subjects with high school and higher education preferred the tapered tooth shape (50% and 48%, respectively). This difference was not statistically significant ($p=0.217$). For the square male facial contour (B), subjects with elementary, high school and higher education (38.3, 50.0 and 54.0%, respectively) preferred the square tooth shape while dental graduates preferred the ovoid tooth shape (47.9%). However, this difference was not statistically significant ($p=0.089$).

For the tapered female facial contour (C), subjects with primary

Table 1 - Aesthetic perception towards different combination of facial contours and upper incisors tooth shape: A – square female facial contour; B – square male facial contour; C – tapered female facial contour; D – tapered male facial contour; E – ovoid female facial contour; F – ovoid facial contour.



education preferred the square tooth shape (46.8%), those with secondary and higher education (48.0 and 54.0%, respectively) preferred the tapered tooth shape and dental graduates preferred the ovoid tooth shape (39.6%). This difference was statistically significant ($p=0.003$). On the other hand, all groups preferred the tapered tooth shape for the tapered male facial contour (D), with no significant difference ($p=0.209$).

For the ovoid female facial contour (E), subjects with elementary, high school and higher education preferred a tapered tooth shape (48.9, 38.0 and 46.0%, respectively) whereas dental graduates preferred the ovoid tooth shape (45.8%). There was no significant difference between groups ($p=0.453$). For the ovoid male facial contour (F), subjects with elementary and higher education preferred the tapered tooth shape (48.9% and 54.0%, respectively) while those with high school education preferred the ovoid tooth shape (54.0%) and dental graduates the square tooth shape (39.6%). There was a significant difference between groups ($p=0.003$).

Discussion

This study assessed the esthetic perception towards different combinations of facial contour and tooth shape by adults with different levels of education. From the 6 sets of photographs assessed, there were significant differences between groups only for the tapered female and ovoid male facial contours. In the former case, dental graduates preferred the ovoid tooth shape whereas the other groups preferred the ovoid or square tooth shapes. In the latter case, dental graduates preferred the square tooth shape while the other three groups preferred the tapered or ovoid tooth shape.

There were two additional findings in this study that must be highlighted. The first relates to the homogenous preferences reported by groups with primary, secondary and higher education (i.e., the groups including lay people), which differed from those reported by dental graduates. Whereas dental graduates preferred the ovoid tooth shape for 4 out of the 6 sets of photographs assessed, the other three groups preferred the tapered or ovoid tooth shape for 5 out of the 6 sets of photographs. As in the present study, Anderson et al.¹¹ concluded that dentists have a preference for ovoid teeth for the incisors.

The second finding is that the shape of the selected teeth was not always similar to the form of frontal facial outline evaluated. Contrary to expected, not even dental graduates preferred those photographs showing the tooth shape that corresponded to the facial contour (i.e., square-square, tapered-tapered or ovoid-ovoid). It occurred only in the case for the tapered male facial contour, for which all groups preferred the tapered tooth shape. Williams⁶ related the facial contour with the shape of the anterior teeth. This theory has been proven and disproved by several studies^{2,4,7,9-10}. However, the majority of these studies determined this relationship by using photographs of the facial contours and comparing them to the intraoral photographs of the upper central incisor. The analysis of the data was done individually with the objective to determine which tooth shape was the most prevalent for each specific facial contour. Brisman³ stated that females should present more round and delicate teeth (tapered or ovoid) while males should have more angulated teeth (square). He also reported that when patients and dentists observed an incisor individually, they preferred it to be longer (3:5 proportion), but when the judgment was made jointly with the

facial contours, shorter teeth were preferred (4:5 proportion) indicating an influence of the facial presentation on the esthetic perception.

Dentists have been searching for ways to standardize fixed characteristics to obtain the composition of each patient or group of patients. This has caused dentists to learn certain characteristics and concepts related to persons with respect to age, gender and personality¹³⁻¹⁴. This can cause limitations in communication among dentists and patients since beauty concepts in society are influenced by other factors such as social, cultural, economic and psychological and each person forms their own perception, which is usually considered as the correct one. Tjan⁵ corroborated this stating that beauty is not absolute but extremely subjective and perception is determined by the senses, knowledge, ethnic background, and preferences of each individual. Mahshid et al.⁶ evaluated dental proportions in a harmonious smile and noted that cultural and individual characteristics, as well as esthetic perception, of each person played an important role in this area. Some studies^{3,15} reported that the esthetic perception did not present statistical differences between genders as was found in this study.

Some limitations of this study need to be discussed. Although groups were homogenous in size and gender distribution, they were statistically different with respect to their ages because it was difficult to find adults with primary education or less. Future studies should try to match groups with similar ages in order to disentangle the potential influence of this factor on esthetic perception.

No general agreement was found in the esthetic perception towards the frontal facial outline and upper incisor shape by educational level. Dentists tend to prefer ovoid shape tooth for almost all frontal facial outline.

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