

Perception of smile attractiveness among Egyptian population

Shereen Mohammed khattab *

BDS,MSc ,PhD.

Abstract

Aim of the study: This study aims to evaluate the standards and perceptions of smile attractiveness within the Egyptian population. This is important for use in clinical and academic settings.

Materials and methods: Two males and two females smiling photos were digitally altered to create Buccal corridors of four sizes (2%, 10%, 22%, and 34%), and spacing in the lateral incisor area was created (1.5, 2, 3mm) increments. (VAS) was used to measure participants' perceptions of smile among 60 participants, including Orthodontists, dentists and laypeople.

Results: As the width of buccal corridors increased, VAS scores consistently decreased. At 10%, Orthodontists gave lesser scores than both dentists and laypersons. But at 34% all groups scored smile as unattractive. Starting from 1.5 mm, both orthodontists and dentists detected the spacing, at 2mm spacing the majority rated the smile as unattractive. Conclusions: Buccal corridors and dental spacing greatly influences smile perceptions and attractiveness among orthodontic professionals, dentists, and laypeople. Orthodontists were more sensitive to moderate changes in the buccal corridors and spacing. Asymmetries should be discussed with patients before treatment. Orthopedic or surgical expansion of the maxilla should be considered.

Key Words: Smile Perception, Dental esthetics,

Buccal Corridor, Dental Spacing

Introduction

Most patients demand orthodontic treatment for esthetic purposes. The identification of the problem is not always a simple task. The view of the orthodontist may be different from that of a layperson. ¹

Smile attractiveness has been perused from many aspects throughout time starting from discussing the golden proportion ²

The buccal corridor has been defined as the proportion between the distance between the upper canines and the distance between the corners of the lips in a smile. ³ While Frush and Fisher stated that the buccal corridor is the distance from the most visible posterior teeth in the smile to the inner commissures of the lips. ⁴

According to Zang et al. The laypersons were unable to differentiate degrees of the buccal corridor except when it was 28%, while orthodontists considered 2% and 10% buccal corridors similarly and at 22% was significantly different. ¹

The concept of beauty is very subjective and is influenced by the opinions of others and the cultural preferences related to smile characteristics. ⁵ The Literature suggests that orthodontists and laypeople have different

*Consultant of Orthodontics, Cairo university hospital.

perceptions of smile when evaluating the orofacial characteristics. Orthodontists are more sensitive in detecting deviations from ideal than the general public does. 6

A.W. Machado et al, found that the most attractive smile was the one without spacing, whereas the presence of diastemas in the upper lateral incisor area was considered unattractive. 7

Thus, numerous studies were performed by using digital-image manipulations to determine more guidelines regarding the perception of smile esthetics. 8-17

According to the literature, an esthetic treatment plan should begin at the maxillary central incisor area. The dental or gingival asymmetries must be carefully analyzed. 9-12

A.W. Machado et al, stated that the most attractive smiles in white and Afro-Brazilian women were those without asymmetries or with a 0.5-mm asymmetry on the lateral incisor. 5

The objective of this study is to determine the influence of buccal corridor and dental spacing in the lateral incisor area on the perception of smile attractiveness among Egyptian orthodontists, dentists and lay people.

MATERIALS AND METHODS

The sample of the present study constituted of four volunteers; two males and two females aged 20 and 22 years. For each subject a set of 8 photographs was prepared. The inclusion criteria were as mentioned according to literature to have ; normal antero posterior molar and canine relationship ,Normal buccolingual inclinations and mesiodistal

angulations of crowns, No teeth spacing or rotations or crowding, Slight curve of spee, Normal over jet and overbite, Average smile line, revealing 75–100% of the maxillary anterior teeth, Good oral hygiene, Free from serious medical problems, The volunteers haven't done previous orthodontic treatment or previous cosmetic treatment for the anterior teeth. The volunteers were informed about the nature of the study and that their photos will be used for medical purposes. Informed consents were prepared and signed by the volunteers. They were instructed that only the lower third of the face will appear in the judging process. Standardized frontal photographs were taken using digital camera Sony, 4.1 Mega Pixels Mpeg movie VX. The camera was adjusted and fixed on a tripod at a constant distance from the volunteer, constant zooming and constant mega pixels were considered. Volunteers were instructed to sit in a fixed position and normal neon light was standard in all photos. Ideal camera position was identified when a line from the middle of the lens to the eye is parallel to the horizontal plane.

The male subject was instructed to be shaven while the female subject was instructed to have her hair tied back. The interpupillary line was adjusted parallel to the horizontal plane. The distance from the outer canthus of the eye to the hairline should be equal on each side. The line from the outer canthus of the eye to the superior attachment of the ear (C-SA) line was taken parallel to the horizontal plane. Both lines were used to establish consistent parallelism between the eyes and the horizontal plane and to prevent tilting of the head in frontal and lateral directions.

Full facial photographs were taken for each subject. These photographs were scanned to the computer system then cut on the computer so as to show the lower third of the face. Using Adobe Photoshop CS version 8 to create to create 8 images for each individual, 4 for altered buccal corridor and 4 for different teeth spacing, creating a total of 32 images.

The photos were divided into two sets; one altered buccal corridor and another set in which altered spacing in the lateral incisor area. The percentage of the buccal corridor was calculated as the ratio between the measurement of the visible maxillary teeth and the width of the inner lip commissure multiplied by 100 ¹. Buccal corridors of smiling individuals were modified to create four sizes of dark spaces in the buccal corridors (2%, 10%, 22%, and 34%). Buccal corridor of 34% was considered very wide but narrow smile, while 22% was considered wide corridor and medium narrow smile, 10% was considered a medium broad, and 2% was considered as a broad smile with no buccal corridors. ¹⁸

Spacing in the lateral incisor area created was (1.5, 2, 3mm) increments. The reference points for these measurements were the middle point of the height of the lateral incisors. In all images, the gingival margins, papillary heights, and the incisal edges were not altered. In all, for both photos used, 16 new images were created.

Every new picture was saved into a file on the computer system. The photographs were gathered and arranged by certain means and order only known by the examiner. The images

were condensed to 50% of life size (each 4.5 × 6 inches) The pictures were color printed on glossy photo paper A3. Photographs were placed in clear protective sheaths and set in a predetermined order for evaluation.

Pictures of the volunteers were prepared and presented to each judge separately. The judges were asked to evaluate the attractiveness of the smile. None of the judges were aware of the aim of the study or the order by which the photos were arranged. VAS (visual analogue scale) was used as a mean for smile evaluation. The scale had scores of 0, 5, 10 with the following interpretations: 0: scored for unattractive smile, 5: scored for attractive smile, 10: scored for very attractive smile

An online form including the visual analogue scale followed by a table including the images numbers was given to each judge. Through that table judges were asked to assign a score for each image according to their perception of the smile attractiveness. 60 judges made the photographic evaluation. 20 were Orthodontists from Faculty of Dentistry, the Department of Orthodontics, and several private practices. 20 judges were dentists from different medical centers, and 20 lay people were selected from ages between (18 and 60).

Judges were asked to record their sex, age, race, education level, occupation. and direction of midline deviation. The judges were told that they will see a series of photographs for the same person. They independently viewed the photographs, each photo for about 10 seconds. They were told to view all photographs for the purpose of making global judgments about the attractiveness of the smile. They were asked

not to concern themselves with extraneous features and to consider similarities or differences of specific features. Judges received a standardized online form which will be filled, including a Visual Analogue Scale

(VAS), which represent a scale of dental-facial attractiveness. All data was gathered in an excel sheet to be ready to perform the statistical analysis.

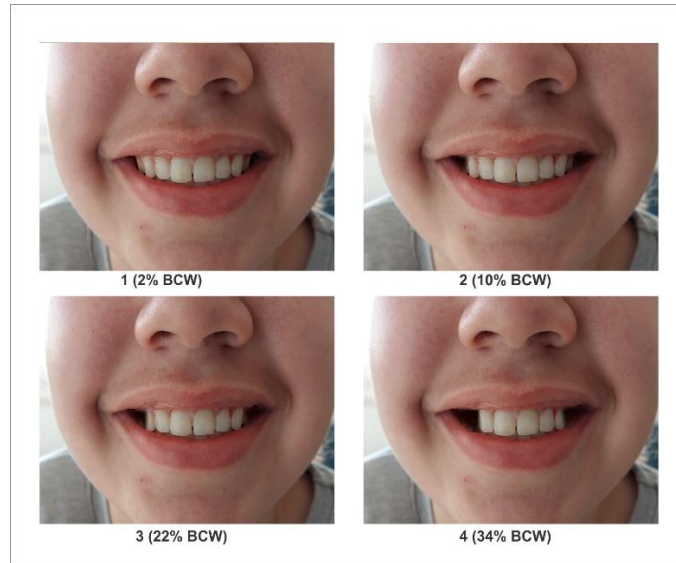


Fig 1: Buccal corridor width alteration



Fig2: Spacing in the lateral incisor area alteration

Results

Data were analyzed using IBM SPSS version 23 for Windows, Armonk, NY, USA. Data were summarized using frequency and percentage. The Pearson Chi Square test was used to analyze differences between the study groups. All tests were two tailed and the significance level was set at p value < 0.05. First in **buccal corridors**, at 2% there was agreement between all groups (Orthodontists, dentists and lay people) that the smile was very attractive on the VAS, there was no significant difference between all groups. At 10%, the lay people still rated the smile as very attractive while the Orthodontists only 40% rated the smile as very attractive. As for the dentists 60% rated the smile as very attractive. There was significant difference between groups. This shows that orthodontists followed by dentists detected the smile unattractiveness earlier than lay people. At 22%, there was 75% of orthodontists rated the smile as unattractive, as well as 60% of the dentists and 50% of the lay people rated the smile as unattractive. This shows that starting from 22% of buccal corridors, smile was unattractive especially to dental professions. Finally at 34% about 90% of all raters' groups rated the smile as unattractive.

Second in the photos of **spacing in the lateral incisor area**, at no spacing all groups rated the

smile as very attractive, while at 1.5 mm spacing 60% of the orthodontists rated them as unattractive smile as well as 50% of the dentists, while only 25% of lay people rated the smile as unattractive, thus there was significant difference in the results. This demonstrates the precise detection of teeth irregularities by both orthodontists and dentists. None of the orthodontists or the dentists rated the 1.5 mm spacing as very attractive, thus there was a significant difference in the results between groups. As for 2mm, 100% of the orthodontists rated them as unattractive as well as 85% of the dentists. About 60% of the lay people rated the smile as unattractive. This shows the impact of 2mm spacing in the lateral incisor area on the attractiveness of the smile. There was significant difference between the orthodontists and lay people groups. Finally, at 3mm about 100% of the orthodontists and dentists rated the smile as unattractive, while 85% of lay people rated the smile as unattractive too. This indicates that by increase spacing from 2-3 mm in the incisor area, was detected by lay people, dentists and for sure by orthodontists and need to be corrected either by orthodontic treatment or by veneers. Orthodontists is the most sensitive group of raters toward minimal discrepancies and that affects their smile perception followed by the dentists followed by lay people.

Buccal Corridor	VAS scores	Orthodontists (n=20)	Dentists (n=20)	Laypersons (n=20)
2%	Unattractive (0)	0 (0%)	0 (0%)	0 (0%)
	Attractive (5)	0 (0%)	0 (0%)	0 (0%)
	Very attractive (10)	20 (100%)	20 (100%)	20 (100%)
	Test (p value)	0.00 (1.00)		
10%	Unattractive (0)	0 (0%)	0 (0%)	0 (0%)
	Attractive (5)	12 (60%)	8 (40%)	0 (0%)
	Very attractive (10)	8 (40%)	12 (60%)	20 (100%)
	Test (p value)	16.800 (<0.0001*)		
	Pairwise comparisons	$p_1= 0.206, p_2<0.0001^*, p_3= 0.002^*$		
22%	Unattractive (0)	15 (75%)	12 (60%)	10 (50%)
	Attractive (5)	5 (25%)	8 (40%)	10 (50%)
	Very attractive (10)	0 (0%)	0 (0%)	0 (0%)
	Test (p value)	2.679 (0.262)		
34%	Unattractive (0)	20 (100%)	20 (100%)	18 (90%)
	Attractive (5)	0 (0%)	0 (0%)	2 (10%)
	Very attractive (10)	0 (0%)	0 (0%)	0 (0%)
	Test (p value)	4.138 (0.126)		

*Statistically significant difference at p value<0.05, p_1 : Comparison between Orthodontists and Dentists, p_2 : Comparison between Orthodontists and Laypersons, p_3 : Comparison between Dentists and Laypersons.

Table 1: Distribution of VAS scores for buccal corridor as perceived by orthodontists, dentists, and laypersons

Spacing	VAS scores	Orthodontists (n=20)	Dentists (n=20)	Laypersons (n=20)
No space	Unattractive (0)	0 (0%)	0 (0%)	0 (0%)
	Attractive (5)	0 (0%)	0 (0%)	0 (0%)
	Very attractive (10)	20 (100%)	20 (100%)	20 (100%)
	Test (p value)		0.00 (1.00)	
1.5 mm	Unattractive (0)	12 (60%)	10 (50%)	5 (25%)
	Attractive (5)	8 (40%)	10 (50%)	10 (50%)
	Very attractive (10)	0 (0%)	0 (0%)	5 (25%)
	Test (p value)		13.175 (0.010*)	
	Pairwise comparisons	$p_1= 0.525, p_2= 0.017^*, p_3= 0.036^*$		
2 mm	Unattractive (0)	20 (100%)	17 (85%)	12 (60%)
	Attractive (5)	0 (0%)	3 (15%)	5 (25%)
	Very attractive (10)	0 (0%)	0 (0%)	3 (15%)
	Test (p value)		12.750 (0.013*)	
	Pairwise comparisons	$p_1= 0.072, p_2= 0.007^*, p_3= 0.113$		
3 mm	Unattractive (0)	20 (100%)	20 (100%)	17 (85%)
	Attractive (5)	0 (0%)	0 (0%)	3 (15%)
	Very attractive (10)	0 (0%)	0 (0%)	0 (0%)
	Test (p value)		8.316 (0.043*)	
	Pairwise comparisons	$p_1= 1.00, p_2= 0.072, p_3= 0.072$		

*Statistically significant difference at p value < 0.05, p_1 : Comparison between Orthodontists and Dentists, p_2 : Comparison between Orthodontists and Laypersons, p_3 : Comparison between Dentists and Laypersons.

Table 2: Distribution of VAS scores for space as perceived by orthodontists, dentists, and laypersons

Discussion

The present study studies the influence of the buccal corridor and spacing in the lateral incisor area on the smile attractiveness. In most studies investigating this subject, Images of the mouth region were used. 1,3,19,20. Previous studies stated that the orthodontists perceived the differences in the buccal corridor better than the laypersons, with statistically significant differences beginning at the 15% buccal corridor. 1 while in the current study orthodontists detected differences in buccal corridor at 10% as well as dentists. At 22% buccal corridor, about 75% of orthodontists rated the smile as unattractive as well as 60%

of the dentists. Both orthodontists and dentists were more sensitive to the detection of buccal corridor increase. This was despite other studies who found that Laypersons and orthodontists have similar preferences of buccal corridors. 20 On the other hand, our results agree with literature that suggests that orthodontists and laypeople have different perceptions of smile esthetics when evaluating a variety of orofacial characteristics, orthodontists are more sensitive in detecting deviations from ideal than is the general public. 9,10, 18,20

Unlike previously published studies, who found that the presence of BCS does not influence smile esthetics and Lay people

showed no preference of arch form, In the current study we found that about 50% of lay people detected the buccal corridor at 22% width and rated the smile as unattractive, while at 34% buccal corridor width, the majority all lay people considered the smile as unattractive. As for spacing in the lateral area perception among Egyptian population, only few studies or none studied this point before, in the current study all groups rated the most attractive smile was with no spacing, while the 1.5 mm spacing was detected by both orthodontists and dentists, but at 2mm spacing, all orthodontists rated the smile as unattractive as well as 85% of the dentists and 60% of lay people. This agrees with literature which found that the most attractive smile was the one without spacing, presence of diastemas in the upper lateral incisor area was considered unattractive. 7The VAS is widely used in studies for assessing the esthetics of the smile. 19,20 The agreement with this method is satisfactory for laypersons and orthodontists, which was corroborated in the present study. 20A number of authors have used Adobe Photoshop to manipulate images, 1,19,20 and this program proved a useful, valid method for image manipulation in the present study as well.

In the current study, there was agreement with literature that an ideal smile arrangement can easily be recognized as attractive by any group of raters. In contrast, when small deviations occur, they start to show differences in their judgments. 5Since we used computer-manipulated images from patients and the opinions of specific groups, the results should be carefully analyzed as stated by Kokich et al. 10 Asymmetries should be discussed with

patients before treatment, Orthopedic or surgical expansion of the maxilla in order to reduce the dark spaces of the buccal corridor should be considered with caution and discussed with patients prior to treatment as well.

Conclusion

- As the width of buccal corridors increased, VAS scores consistently decreased. Orthodontists and dentists were more intolerable to increase in buccal corridors than laypersons starting from 10%, orthodontists gave lesser scores than both dentists and laypersons. At 22%, there was 75% of orthodontists rated the smile as unattractive, as well as 60% of the dentists and 50% of the lay people rated the smile as unattractive.
- Starting from 1.5 mm, both orthodontists and dentists detected the spacing, at 2mm 100% of the orthodontists rated them as unattractive as well as 85% of the dentists. About 60% of the lay people rated the smile as unattractive.
- Buccal corridors and dental spacing greatly influences smile perceptions and attractiveness among orthodontic professionals, dentists, and laypeople. Orthodontists were more sensitive to moderate changes in the buccal corridors and spacing. Asymmetries should be discussed with patients before treatment. Orthopedic or surgical expansion of the maxilla in order to reduce the dark spaces of the buccal corridor should be considered.

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