

PERCEPTION OF BUCCAL CORRIDORS EFFECT ON SMILE ESTHETIC AMONG SAUDIS: A SURVEY

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ABSTRACT:

Objectives:To evaluate changes in attractiveness on the basis of computerized variations of smile arcs and buccal corridors smiles judged by orthodontists and laypersons.

Materials and Methods:Using ordinal scale in a computer-based survey, Orthodontist and laypeople rated the attractiveness of 5 digitally altered smile with buccal corridors variations. The variations were conducted in a clinically relevant manner and based on standards set by experienced orthodontist. 229 laypeople and 32 orthodontist were recruited in this study.

Results:The results indicate that both laypersons and orthodontists prefer smiles with minimal buccal corridors. Significantly lower attractiveness smile were found for smiles with excessive buccal corridors. No significant differences were found between male and female judges.

Conclusion:Having minimal buccal corridors is a preferred esthetic feature in both men and women, and large buccal corridors should be included in the problem list during orthodontic diagnosis and treatment planning.

Keywords: Buccal Corridors, Smile, Esthetic



INTRODUCTION:

Most orthodontists understand that the achieving of optimal esthetics is complex and involves the relationship of the teeth to both intraoral and extraoral soft tissues. Two aspects of smile esthetics, smile arc and buccal corridor space had captured the interest of clinicians despite little scientific evidence (Brislin, 1968). Therefore, an attractive, well-balanced smile is one of the treatment objectives as well as creating a functional occlusion. Another important smile aspect is the presence or absence of buccal corridor spaces. (Frush and Fisher, 1958) defined buccal corridors as the spaces between the facial surfaces of

the posterior teeth and the corners of the lips when the patient is smiling. In western countries, different aspects of the preference of buccal corridors have been reported. (Hulsey, 1970) reported that the buccal corridor ratio appeared to be of no significance to an attractive smile. He examined the influence of buccal corridors on smile attractiveness and concluded that variations in buccal corridors seemed to have no significance. However, Hulsey measured the ratio of the distance between the maxillary canines to the distance between the corners of the smile; that is not an actual measure of buccal

corridors. On the other hand, (Moore et al. 2005) reported that having minimal buccal corridors was a preferred esthetic feature for both male and female judges.

As the quality of life in The Kingdom of Saudi Arabia has improved in the last few years there is an increasing demand for orthodontic treatment and cosmetic dentistry. Yet there are no clear standards or specifications for what is considered attractive and what is not in certain aspects related to the orthodontic treatment. Only a few studies have determined the esthetic value of the buccal corridor. To date, there has been no report attempting to compare the impact of buccal corridors on smile esthetics in Saudi subjects. Therefore, The purpose of this study was to determine the effect of buccal corridor on smile attractiveness when judged by Saudi orthodontists and Saudi laypersons.

MATERIALS AND METHODS:

The overall plan was to alter the amount of buccal corridor in subject's smiling images and to have these images judged for smile attractiveness by a panel of laypersons and orthodontist of both genders. A sample size calculation was undertaken and showed that 32 orthodontists and 229 laypeople were needed to be included in this study. A full frontal face colored photographs of five Saudi males aged 22-25 years with aligned teeth, class I occlusion or very mild class I malocclusion, orthodontically and non- orthodontically treated and

well proportioned faces were obtained from different persons. Although as Chan A. Chang (2011) found that Smile variables without a facial context were not affected by facial attractiveness. These images were taken at fixed 120 centimeters distance from the film to subject using the same camera under the same conditions including flash light, zoom of the lenses, sample position and camera type (canon 7D, Focal length: 55, Exposure time: 1/60).

Furthermore, an ethical informed consent was obtained from each one of the candidates. These photographs were digitally modified using Adobe Photoshop CS4 program to create the illusion of narrow smile fullness (28% buccal corridor), medium narrow smile fullness (22% buccal corridor), medium smile fullness (15% buccal corridor), medium broad smile fullness (10% buccal corridor), and broad smile fullness (2% buccal corridor) for each subject, with editing the shade of the teeth by brighten it to obtain uniform shade for all the five subjects to exclude the effect of the shade on the judgment. The only difference between altered images of the same subject was the amount of buccal corridor (smile fullness). Consequently, the effect of all other variables e.g, minor differences in head position, amount of incisor display) was eliminated.

(Fig1.) Buccal corridor was calculated as difference between visible maxillary dentition width and inner commissure width divided by inner commissure width

(Fig2). Both ratios were reported as percentages. A computer-based survey was designed to show these five created photographs for each subject at a time using an ordinal scale. The photos were presented in random order and scored on a 5-point likert type scale from 1 for least attractive picture to 5 for the most attractive picture. (Fig3). A targeted sample of 32 Saudi orthodontists (both male and female), 107 Saudi female laypersons and 122 Saudi male laypersons were selected to evaluate each subject utilizing a 13.4-inch laptop (13.3-inch (diagonal) LED MacBook Pro) under supervision of researchers during subjects evaluation of the 229 laypeople and 32 orthodontist evaluators to control the time to make sure that they give the time for each picture of the

patient which is 45 seconds for each subject evaluation and if the evaluator exceeded it, his evaluation was cancelled. After obtaining a detailed informed consent each evaluator was asked to arrange the five photographs of each subject by giving it an order from 1, which is for the most attractive to 5, which is for the least attractive.

15 randomly selected evaluators from each of the laypeople and orthodontists were asked to evaluate 5 images twice at least 2 weeks later to determine reliability. Intra-class correlation coefficients were used for determining intra-evaluator agreement. High levels of reliability were found, since all intra-class correlation coefficients were greater than or equal to 0.7.

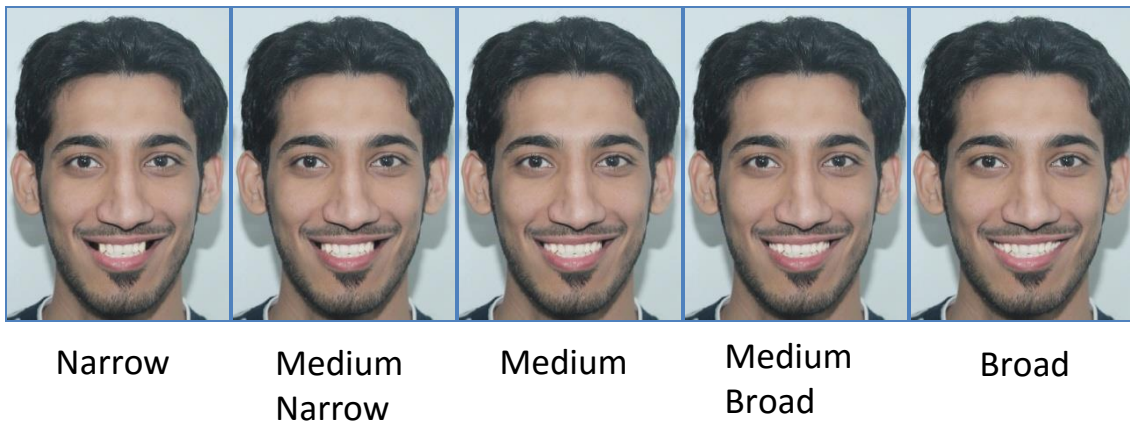


Fig 1: The illusion of narrow smile fullness (28% buccal corridor), medium narrow smile fullness (22% buccal corridor), medium smile fullness (15% buccal corridor), medium broad smile fullness (10% buccal corridor), and broad smile fullness (2% buccal corridor)



Fig 2: Measurement of the buccal corridors was calculated as the difference between visible maxillary dentition width (A) and inner commissure width (B) divided by inner commissure width.

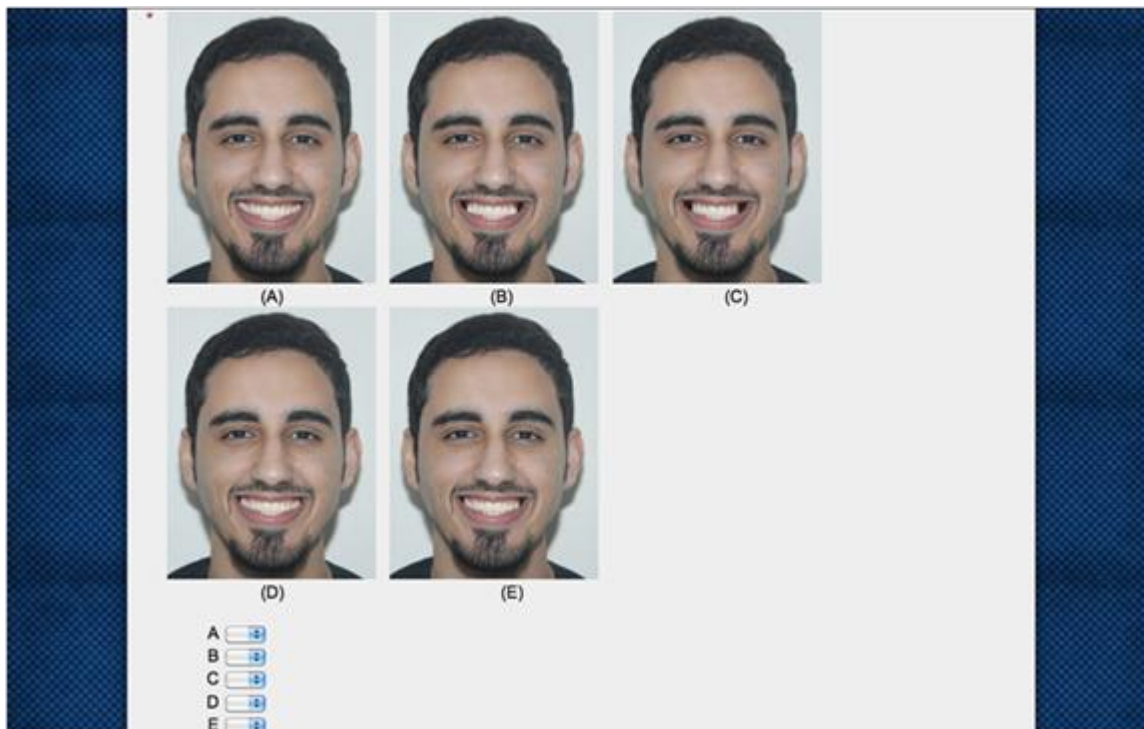


Fig 3: Part of the computer-based survey used in this study showing the edited five photographs for the samples, (C) narrow smile fullness (28% buccal corridor), (B) medium narrow smile fullness (22% buccal corridor), (E) medium smile fullness (15% buccal corridor),

(D) medium broad smile fullness (10% buccal corridor), and (A) broad smile fullness (2%buccal corridor).

RESULTS:

A consistent relationship between smile fullness (buccal corridor) and smile attractiveness was shown in this study. Generally, The broader the smile (the smaller the buccal corridor), the more attractive the panel judged the smile to be. Similarly, the narrower the smile (the larger the buccal corridor), the less attractive the smile. However, excessive teeth showing (2% buccal corridors) was not considered as the best attractive smile. On average, medium broad smile fullness (10% buccal corridors) was rated by both the orthodontists and laypeople as the most attractive followed by medium smile fullness (15% buccal corridors), broad smile fullness (2% buccal corridors), medium narrow smile fullness (22% buccal corridors) and finally

narrow smile fullness (28% buccal corridor) as the least attractive smile. Independent T test was conducted in this study to compare the variables. There was no significant difference in judging the effects of buccal corridors on the smile attractiveness between male and female evaluators for both the laypeople and orthodontists with an exception found on medium broad smile fullness (10% buccal corridors) which detected differences ($P>0.05$). Interestingly, both orthodontists and laypeople ranked the medium broad smile fullness (10% buccal corridors) most attractive with a mean of (4.6) ranked by Orthodontist and (4.1) by Laypeople. Furthermore, narrow smile fullness (28% buccal corridors) reported as the least attractive by both orthodontist and laypeople. (Fig.4) (Table.1)

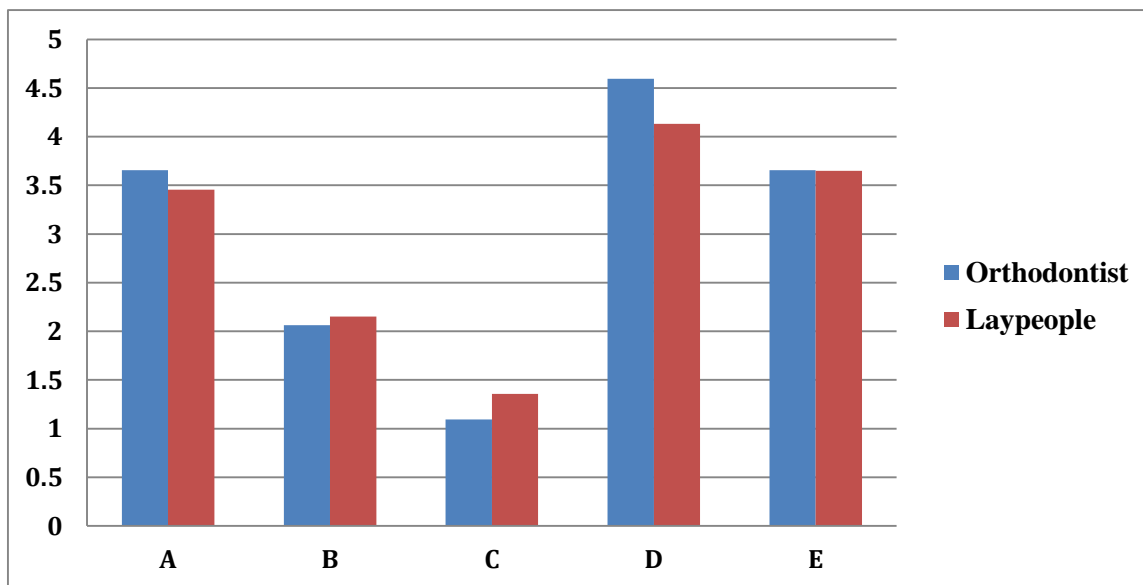


Fig.4: shows the mean score for each photos reported by the orthodontist and laypeople

Photo	Orthodontist	Laypeople
A	3.6562	3.4541
B	2.0625	2.1528
C	1.0938	1.3581
D	4.5938	4.131
E	3.6562	3.6507

Table 1: Shows the mean average score for all the photos ranked by the laypeople and the orthodontist

DISCUSSION:

Nowadays the buccal corridor is more commonly referred by orthodontist as negative space present between the lateral aspect of maxillary posterior teeth and the corner of the mouth during smiling which appears as a black space (Tikku,2012). Inclusion of both orthodontically and non- orthodontically treated subjects in our study was based on findings of Rigsbee et al 1988 who found proportions of 40% for negative space in an orthodontically treated group, and 42% for a non-orthodontically treated group, with no statistical difference between these groups. Ritteret.al 2006 attributed this difference between studies to the light conditions under which the photographs are taken. Because teeth are positioned more posteriorly in the buccal corridor, light becomes reduced, which causes a gradual darkening and consequently less observation of these posterior teeth. The less-illuminated the photograph, the larger will be the negative space because less teeth will be observed, thus reducing the arch width, whereas the smile width

is the same. Therefore, there may have been differences in the standardization of light conditions between studies, impairing comparison between them.

In our study subjects photographs were taken at fixed 120 centimeters distance from the film to subject using the same camera under the same conditions including flash light, zoom of the lenses, sample position and camera type which limit the effect of this factor.

The results of this study showed that medium broad smile fullness (10% buccal corridors) as the most attractive smile by both laypeople and orthodontists. Narrow smile fullness (28% buccal corridors) was considered the least attractive smile by both groups. These findings contrast sharply with those of Hulse, (1970) who reported that lay persons had no preference regarding buccal corridor width and that width variations seemed to be of no significance in determining smile attractiveness. However, Husly used the inter canines width/ smile width ratio and did not take into consideration any

visible dentition distal to the maxillary canines. Hulseley did not examine buccal corridors as described by Frush and Fisher (1958). Also Hulseley used pictures limited to the mouth, which limited the overall picture and evaluation. In addition, (Moore et al 2005) in a recent study reported results similar to our study results with an exception of that medium broad smile fullness (10% buccal corridors) scored the second most attractive while the 2% buccal corridor with more teeth showing scored the most attractive smile. The slight changes in the results represents the slight changes in the perception between Saudi Arabia and the western region. Although, many other authors (Dierkes, 1987; Blitz, 1997; Morley and Eubank, 2001; Sarver, 2001 ; Sarver and Ackerman, 2003) found that small buccal corridors are more attractive.

There is a difference not only between what various groups consider esthetic but also in what is considered esthetic for different subjects according to their age and race. Evidence suggests that the esthetic components for men, women, and various races are not entirely the same, and this agree with (Stockebrand et al 2010) who distributed a dental esthetic questionnaire with different ethnic groups residing in Germany, raters evaluated frontal smile photos of 8 male and female models, and the investigators reported differences between 3 ethnic groups (German, Russian, and Turkish). These studies indicate that nationality and ethnicity do influence dental esthetic perception.

Laypeople and orthodontists discriminated between all the 5 degrees of smile fullness which will result in translation into our clinical practice. In other words, although this study points to the importance of minimizing buccal corridors in maximizing smile esthetics, smile fullness is one of the features that determine smile attractiveness, also tooth shade, gingival show, tooth length and shape play an important roles. Since smaller BCs were perceived to be more attractive than larger BCs, orthodontists might consider maximizing maxillary width when it does not compromise other treatment goals. Traditionally, it has been thought that the maxillary arch should only be expanded when it is narrow in relation to the mandibular arch. Expansion may also be appropriate for adults with excessive lingual crown torque of the mandibular molars or for mixed-dentition patients with mild to moderate crowding that can be resolved with a mandibular lip bumper and maxillary expansion treatment (Ferris *et al.*, 2005; Solomon *et al.*, 2006). Importantly, these findings should not be used to justify routine expansion.

There was no significant difference in judging the effects of buccal corridors on the smile attractiveness between male and female raters. These findings agree with those of Hideki Ioi *et al.* 2009. The clinician should avoid excessively wide buccal corridors with ideal smile arcs to achieve esthetic smiles. These goals can be achieved by carefully planning treatment and by attending to arch form, the inclination of the occlusal plane, and

anterior vertical tooth position, especially during finishing.

CONCLUSION

- Excessive buccal corridors (28%) smiles are rated as least attractive by both orthodontists and laypersons.
- Having narrow smile fullness (28% buccal corridor) should be included in the problems list.

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