

Comparing Orthodontist, Prosthodontist, Dental and Non-Dental Student Views on the Impact of Buccal Corridor on Smile Attractiveness of Women with Different Face Shapes

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Objectives Today, creating a balanced and attractive smile is the main goal of treatment in modern orthodontics. The buccal corridor is one of the controversial aspects of the smile attractiveness. The aim of this study was to compare the impact of buccal corridor on smile attractiveness of women with Mesoprosopic, Leptoprosopic, and Euryprosopic face types, from the perspective of orthodontists, prosthodontists, Dental and non-dental students.

Methods In this comparative cross-sectional study, Photos were taken from 3 women with different face types and by making some changes in these photos, 5 buccal corridors (2%, 10%, 15%, 22% and 28%) were created for each one. Eventually, in order to survey, each 15 pictures were provided to individuals in the study group. Statistical analysis was performed by SPSS21 software, using K-S (Kolmogorov-Smirnov), Kruskal Wallis and Mann Whitney tests. p -value < 0.05 was considered significant.

Results Orthodontist and non-dental students considered that nearly wide smile for leptoprosopic face shape and wide smile with the minimum buccal corridor for variety of mesoprosopic and euryprosopic face shapes have the most attractiveness ($p < 0.05$). Prosthodontists considered wide and narrow smiles as the least attractive regarding all types of faces ($p < 0.05$).

Conclusion Face shapes did not have a significant impact on the selection of the most attractive smile by prosthodontists, while orthodontists and non-dental students shared a similar view on the selection of the most attractive smile regarding the face shape.

Keywords Buccal corridor, Face pattern, Smile attractiveness

Introduction

Today, creating a balanced and attractive smile, is the main goal of treatment in modern orthodontics.¹ Prosthodontists also due to placing dentures for edentulous patients are not except from this rule.² Several criteria have been defined for attractive smile, among them are: Visibility of maxillary anterior teeth, the relationship between edge of maxillary anterior teeth with internal curvature of the upper lip, number of visible teeth in a smile, the relationship between the anterior teeth of two jaws, coordination between age and smile, coordination between personality and smile³, visibility of the gum⁴, midline conformity of the face and teeth⁵, the size of the buccal corridor⁶, and the angle between the occlusal plane and horizontal plane.^{7, 8} However, various studies have proven that, mechanical muscles are effective in creating attractive smile.⁹ Today, one of the controversial aspects of smile attractiveness is the size of the buccal corridor. It is thought that maxillary tightness; pulling teeth of upper jaw, rotation of maxillary molars, or even the position of anterior and posterior maxillary have effects on it. Studies on investigating the effect of buccal corridor width on smile attractiveness, have similar and in some cases contradictory results.¹⁰ Some researchers claim that small amount of buccal corridor makes the smile more attractive.^{11, 12} Moore *et al.*, In their

studies suggested that wider smiles without showing the buccal corridor are more attractive compare to smiles with buccal corridor.¹³ At the same time, several other studies have suggested that reducing the amount of buccal corridor has a negative characteristic in smiling¹⁴⁻¹⁷, or even the buccal corridor does not have an effect on smile.¹⁸ The importance of buccal corridor on smile attractiveness has been clearly reported on the study by Frush *et al.*, The obtained data revealed that the presence of buccal corridor adds a natural state to teeth, while its absence creates an artificial appearance in patients.¹⁹

Moore *et al.* reported that wide smile without presence of buccal corridor is more attractive than a smile with buccal corridor.¹³ Johnson and Smith evaluated the effect of removing the premolar teeth on the visibility of negative space (buccal corridor) and did not find any association between tooth extraction and negative space.²⁰ Recently, a study has suggested that, large corridor buccal space can be included in the list of problems, but very small buccal corridor can be left untreated.²¹ Due to the lack of extensive research on the amount of buccal corridor in people with different face types, there is an information void, on the other hand, importance of beauty and people understanding, especially women about it have increased significantly in the present time. Therefore, we decided to compare the orthodontist, prosthodontist and non-dental student views

on the impact of buccal corridor on smile attractiveness in women with different face types. Therefore we could take better and more accurate steps towards achieving the beauty goals of various treatments.

Materials and Methods

In this comparative cross-sectional study, 4 groups of the study subjects consisting of 15 orthodontists, 8 prosthodontists, 170 non-dental students and 58 dental students in Guilan province were examined regarding their views on the impact of buccal corridor on the smile attractiveness of women with different face types. Non-dental students were selected from the public and nongovernmental schools of Anzali, using stratified random sampling based on the number of native students of this city in each school ($d=0.075$ and $p\text{-value}=0.4888$).

The mean age ranged 15 to 45 yrs. Photos were provided to 170 students of majors (excluding dental majors), all of orthodontist, prosthodontists and dental students of Guilan province, (with the number of 8, 15 and 58, respectively). First, 3 women with variety of different face types of mesoprosopic, leptoprosopic, and euryprosopic, who had undergone orthodontic therapy were selected based on facial index. Facial index is the ratio between nasion – gnathion to the width between cheeks multiplied by 100.
$$\text{facial index} = \frac{\text{Nasimental length}}{\text{Bizygomatic width}} \times 100$$

Nasion is the anterior-point of meeting point of nasal and frontal bones, and gnathion is the center of lower point on the mandibular symphysis (lower end of the jaw).

Leptoprosopic face type is a face with facial index, bigger than 90-94.9%, mesoprosopic face type is a face with facial index between 85% to 89.9%, and euryprosopic face type is a face with facial index between 80% to 84.9%.²² The distance between nasion-gnathion using digital caliper and width between cheeks using arc caliper were measured and recorded. Then, informed consent was obtained, photos of front view were taken while voluntarily or socially smiling by Canon camera (D610, Tokyo, Japan), at a same distance and same condition. Same changes were applied including correction of existing asymmetries, correction of minor heterogeneous which might have been effective in the face attractiveness, adjusting the color of photos for better quality of printing, and eventually creating the desired amount of buccal corridor. The buccal corridor was calculated by the ratio of the distance between corners of inner lip and the width of maxillary interproximal to the distance between corners of inner lip multiplied by 100 (Fig. 1).

Then, for each face shape, 5 different modes with different buccal corridor were created. The 5 modes are:

- Buccal corridor 2% (wide smile)
- Buccal corridor 10% (nearly a wide smile)
- Buccal corridor 15% (mediocre smile)
- Buccal corridor 22% (nearly a narrow smile)

Buccal corridor 28% (narrow smile)

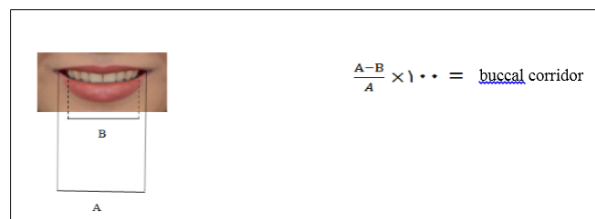


Figure 1- Method of calculating the percentage of buccal corridor

At the bottom of each photo a scaled line 0-100 (VAS line) was prepared, with the explanation that zero represents the least attractive and the number 100 represents the most attractive. Also, at the top of each page, a question was placed, determining the amount of attractiveness of each photo on the specified range under it. Participants specified their opinions separately on the VAS line for each 15 photos (Fig. 2). In the end, the age and sex of each participant in this study as well as experience of experts were recorded.



Figure 2- Sample questionnaire

The statistical analysis of the obtained data was performed by SPSS21 software, using K-S (Kolmogorov-Smirnov), Kruskal Wallis and Mann Whitney tests. The $p\text{-value}<0.05$ was considered significant

Results

The rate of the subjects in the orthodontists, prosthodontists, non-dental students and dental students was 20%, 37.5%, 73.6% and 77.6%, respectively. The mean and standard deviation of age in orthodontists was 41.7 ± 7.9 years, in prosthodontists 40.5 ± 8.9 years, in non-dental students 22.8 ± 5.3 years and in dental students 24.4 ± 2.6 years. In terms of work experience, the mean and standard deviation of orthodontists was 11.4 ± 8.4 years and of prosthodontists 9.7 ± 7.6 . Table 1 shows the VAS

score of smile attractiveness in 4 study groups.

Table 1- Compare statistical indicators VAS score a beautiful smile in 4 groups

		Orthodontists (Group 1)	prosthodontists (Group 2)	non-dental students (Group 3)	dental students (Group 4)	P-value*
Leptoprosopic face (mean±SD)	2%	71.5±18.6	42.4±32	49.8±25	58.2±26	0.011
	10%	75.9±16	67.5±21	58±24	57±23	0.014
	15%	74.9±18	81.9±20	62.9±24	58.9±22	0.002
	22%	50.9±18	63±22	44±23	48.9±23	0.12
mesoprosopic face (mean±SD)	28%	33.7±21	44.4±23	28.3±21	42±25	0.001
	2%	67.7±28	43.6±33	40±28	47.6±25	0.02
	10%	66±23	57.5±22	45.7±28	45.9±24	0.02
	15%	57±19	58±20	45.8±26	46.2±24	0.17
euryprosopic face (mean±SD)	22%	47.6±19	67.5±24	43.8±24	44±24	0.06
	28%	33±22	51.8±23	32±25	42±26	0.02
	2%	73.5±26	45±26	40.6±26	44±28	0.001
	10%	72.9±13	69.9±23	49±24	43±27	0.0001
euryprosopic face (mean±SD)	15%	64.7±16	69.9±17	51±25	42±26	0.000
	22%	50±20	55±18	43±23	39±25	0.04
	28%	35±20	45±28	28±20	34±24	0.2

*Kruskal Wallis test

In table 1, the statistical indices of the four groups were compared regarding different buccal corridors in a variety of face forms. According to the data in this table, apart from the mesoprosopic face type with buccal corridors of 15% and 22%, euryprosopic face form with buccal corridor of 28% and leptoprosopic face shape with buccal corridor of 22%, there was significant difference in VAS score of smile attractiveness in all photos of the 4 groups (orthodontists, prosthodontists, dental and non-dental students).

Comparison of the VAS score of smile attractiveness, by face form in dual groups, showed the views of orthodontists

and prosthodontists about the mesoprosopic face type with buccal corridor of 22% ($P = 0.03$) and in the case of euryprosopic face shape with buccal corridor of 2% ($P = 0.021$) had significant difference. Regarding the mesoprosopic face type with buccal corridor of 22%, higher VAS score of smile attractiveness was assigned by prosthodontists than by orthodontists. However, in the case of euryprosopic face type with buccal corridor 2%, higher VAS score of smile attractiveness was assigned by orthodontists than by prosthodontists. The data of comparison between other groups are given in table 2.

Table 2- Comparative study of VAS score in double groups*

		Group 1 and 2	Group 1 and 3	Group 1 and 4	Group 2 and 3	Group 2 and 4	Group 3 and 4
Leptoprosopic face (mean±SD)	2%	0.05	0.05	0.003	0.17	0.53	0.04
	10%	0.36	0.002	0.02	0.19	0.34	0.58
	15%	0.3	0.008	0.16	0.006	0.03	0.16
	22%	0.2	0.68	0.23	0.1	0.04	0.12
Mesoprosopic face (mean±SD)	28%	0.4	0.27	0.3	0.63	0.05	0.000
	2%	0.13	0.02	0.003	0.8	0.76	0.06
	10%	0.3	0.002	0.013	0.24	0.18	0.7
	15%	0.9	0.07	0.12	0.17	0.2	0.9
Euryprosopic face (mean±SD)	22%	0.03	0.6	0.59	0.008	0.01	0.9
	28%	0.09	0.3	0.69	0.18	0.03	0.01
	2%	0.2	0.001	0.0001	0.83	0.6	0.4
	10%	0.65	0.0001	0.0001	0.02	0.05	0.12
Euryprosopic face (mean±SD)	15%	0.7	0.0001	0.04	0.002	0.04	0.01
	22%	0.7	0.05	0.22	0.05	0.16	0.2
	28%	0.4	0.6	0.14	0.24	0.08	0.13

*Mann Whitney Test

Discussion

Smile attractiveness depends on many factors and today the amount of buccal corridor is one of the controversial aspects of it. The aim of the present study was to investigate the impact of buccal corridor on the smile attractiveness of women with different face types. In most studies in this field, only frame photos of smile and mouth have been used for evaluation^{10, 14}, in this case they might not be able to assess face patterns and other facial parts.¹ While, in this study, full-face photos of people with different face shapes have been used for evaluating the impact of buccal corridor on their smile attractiveness.

Matheus¹ and Sabrina²³ used the full-face photos. In many studies, it is considered that the gender of the studied photos does not have effect on the results. Hideki only used woman's smile in his studies, while the results were generally expressed.⁶ However, In the studies of Oshagh and Ryan, the photos of the both sexes have been used^{5, 10}, in agreement with our study with gender segregation of the photos.

In our study, Adobe Photoshop software was used to make the desired changes in the photos. Oshagh, Hideki and Sabrina, also used this software in their studies.^{6, 10, 23}

In the present study, the VAS line was used to evaluate smile esthetic of each photo. In fact, the VAS line was used

as a common tool for pain intensity measurement that has good reliability. So far, many authors have used this tool to judge the attractiveness. Its use in scoring for beauty and attractiveness provides simple, fast, and reproducible results.^{10, 23, 24}

Our obtained data indicated that the views of prosthodontists were the same and in all types of face forms with mediocre smile were attractive to them, regarding the effect of buccal corridor on the smile esthetic. The views of orthodontists and non-dental students were similar but different from the previous one, confirming that the width of the dental arch should be proportional to the width of the face, therefore mediocre smile (nearly a wide smile) in the leptoprosopic face form, and wide smile in the mesoprosopic and euryprosopic face forms had maximum attractiveness. In other words, in their views, a narrower dental arch for narrower faces (leptoprosopic), and a wider dental arch for wider faces were more attractive. This conclusion contradicts the results of the study performed by Sabrina, because in his study the views of orthodontists were the same in the both face forms.²³ However, Ryan showed that the face form had effect on their investigated factor (the dental midline deviation), which was more acceptable in euryprosopic face form.⁵

Also, the differences observed in the views of our study groups (orthodontists, prosthodontists, dental and non-dental students) can confirm the effect of the profession of judges on their point of view. The effect of this issue was observed in the study of Abu-Alhaija, and the views of ordinary people, orthodontists, and general physicians differed in the different sizes of *buccal corridor*.³ Oshagh *et al.*, showed that dental students understood the difference between different sizes of buccal corridor better than art students and ordinary people.¹⁰

Regarding the effect of referees' gender on the assessment of buccal corridor's attractiveness, the results of our study showed that the gender of referees has no effect on the mean scores given to smiles with different buccal corridors in various face forms. Abu-Alhaija also did not report gender difference in the assessment of buccal corridor³, while Sabrina showed that female referees have more critical view on buccal corridor than male judges.²³

In the study of Alhammadi *et al.*, male dental students, have a better perception of facial and dental esthetics than females.²⁵

In the study of Abu-Alhaija *et al.*, among narrow, mediocre and wide buccal corridor, the lowest score was assigned to wide buccal corridor.³ Findings of the present study confirmed the data of the above mentioned study, in a way, that in each of the three study groups, the lowest attractive score was given to the largest buccal corridor. However, Oshagh *et al.*, showed that besides buccal corridor of 28%, the least attractiveness was observed in buccal corridor of 2%, according to the views of all groups (art students, dental students, and ordinary people). In their study, mediocre buccal corridor had the maximum attractiveness.¹⁰ This conclusion was similar to the results of our study in the prosthodontics group, which they preferred mediocre buccal corridor in the all face forms.

Springer *et al.*, reported that ordinary people assigned the most desirable score to buccal corridor 13% (6 to 26.5%).²⁶ In the study of Abu-Alhaija *et al.*, the highest score was assigned to narrow buccal corridor.³ Oshagh *et al.*, reported that buccal corridors of 15% and 22% in female photos and buccal corridor of 10% and 15% in male photos had the most attractiveness.¹⁰ In our study, orthodontists and non-dental students also had views similar to the results of the above studies, apart from that, they assigned the most score to the mesoprosopic and euryprosopic face forms with buccal corridor of 2%, and the most attractiveness to leptoprosopic face form with mediocre buccal corridor.

Nimbalkar *et al.* noticed, the width of the buccal corridor space influences smiles attractiveness in different facial types. A medium buccal corridor (15%) was the esthetic characteristic preferred by all groups of evaluators in short, normal, and long face types.²⁸

Conclusion

It is concluded that:

1. The maximum amount of buccal corridor had the least attraction from the viewpoint of all four groups.
2. The face form also had effect on the viewpoints of orthodontists and non-dental students regarding the smile esthetic, but in the views of prosthodontics and dental students there was no effect.

Conflict of Interests

None Declared ■

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